REER

SAFETY AUTOMATION MEASUREMENT AND CONTROL

2007 Catalog

INTRODUCTION TO THIS EDITION

Founded in 1959, **Reer** today is the leading Italian manufacturer of optoelectronic safety sensors and one of the most important in the world.
Our catalogue presents a vast range of optoelectronic safety light curtains and grids, monitoring sensors, laser scanners, and dedicated interface modules.

Thanks to our extensive experience as a supplier to the major manufacturers in the machine tool, automotive, robotics, and palletiser sectors, among many others, Reer is now able to offer the perfect solution for the protection of each individual industrial application.

The wide selection of optoelectronic sensors of the needed safety categories makes the Reer catalogue one of the most complete in the world of safety, thanks to the practically limitless variety of models but above all to the particular application characteristics drawn from the needs of the users.

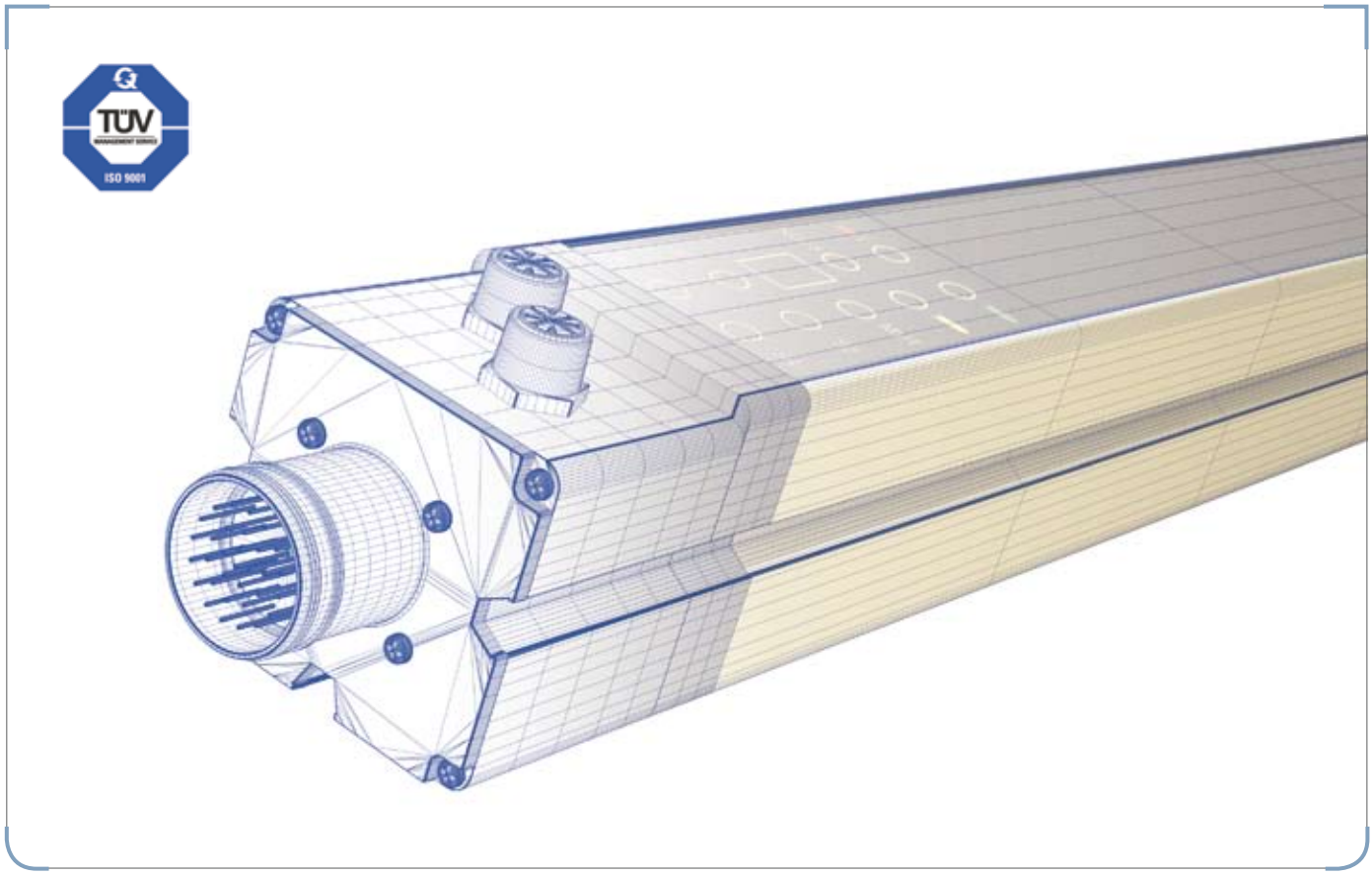
Our participation on the main European and IEC committees for optoelectronic safety sensors means that Reer is always in the forefront in following the evolution of the regulatory requirements; at the same time, our experience is placed at the service of safety in the workplace.

On the strength of our know-how in safety sensor production, Reer now presents a new range of safety barriers for detection, measurement, and control that is state-of-the-art in terms of both cost and performance.

Reer is present throughout the industrialised world with an extensive and highly qualified distribution and after-sales network stretching over the five continents.

Our constant growth year by year confirms that the Reer formula – product safety and quality, reliability and customer service – continues to be the right approach to today's industrial safety market.

Turin, April 2007



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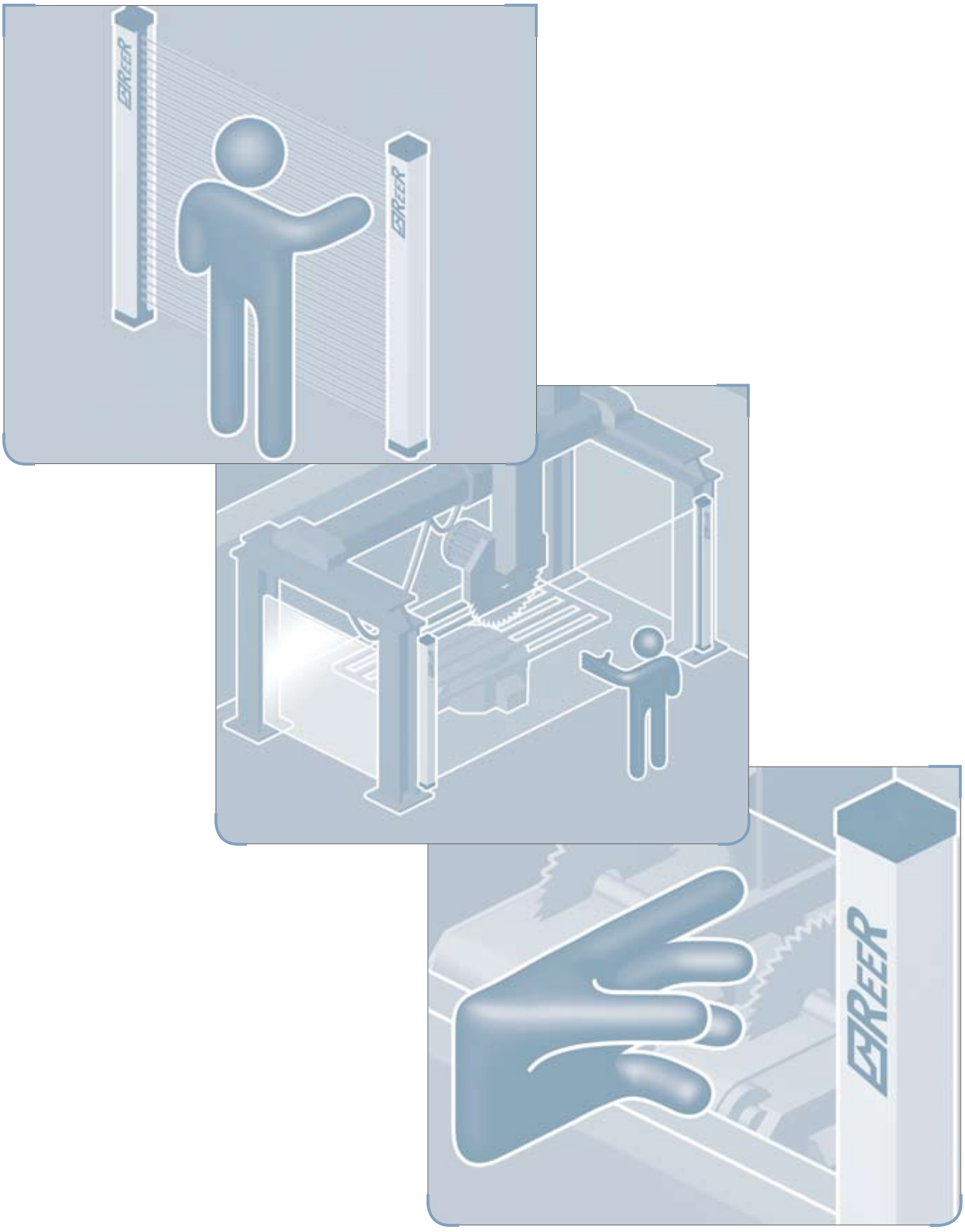
SAFETY IN THE WORKING ENVIRONMENT



SAFETY IN THE WORKING ENVIRONMENT

INTERNATIONAL STANDARDS

In many cases in this safety guide we will distinguish between the European and the Northern American approach to the various topics and regulations concerning machine safety. This is done to better explain the details of this very varied and sensitive field. In practice, however, in many cases concerning protective equipment an International Standard has been established on the two sides of the Atlantic and often in all the main industrialised countries. That is thanks to the work of the IEC and the ISO international committees.

In particular, the 61496 series Standards about optoelectronic protection devices have been developed in the IEC framework and than adopted as harmonized Standards in Europe thanks to the Dresden Agreement, even though it is better to know that minor differences still exist today between the European (EN) and the international (IEC) versions of these Standards.

Another important set of Standards, IEC 61508-1, 7 deals with the safety of electric and electronic programmable equipment. Safety Integrity Levels (SILs) are established based on the probability of the occurrence of dangerous faults in the device during its lifetime. In an approximate fashion, one could say that the behaviour under the occurrence of a fault for Category 4 and SIL 3 on one side, and Category 3 and SIL 2 on the other have very similar requirements when it comes down to electronic protective devices. The IEC (International) and CENELEC (European) Electro-technical Standardization Committees are drawing new Standards based on the IEC 61508 series, more tailored to the machinery world in which the SIL and the Category approaches are uniformed.

EUROPEAN APPROACH

EUROPEAN DIRECTIVES

The aim of the EC Directives is to harmonize the national legislation of the Member States so as to have common regulations concerning technical, economic, social aspects, etc. and to facilitate the free circulation of goods, service and people within the European Union.

In particular, where the safety of workers is concerned, the harmonization of legal provisions has resulted in the formulation and approval of Directives and Standards of great importance.

DIRECTIVES	Define the objectives to be achieved.
STANDARDS	Define the means and methods by which to achieve the objectives established by the Directives. A product/service that complies with the harmonized Standards is presumed to conform to the Directives.
	Stages for the realization of a Standard: • Creation of a Working Group (WG) made by experts of the subject to be treated, which represent the Member States. • Preparation of a draft version of the Standard (prEN) to be examined by the various national Committees involved, for comments, proposals and the subsequent final approval. • Drafting of the definitive formulation of the text of the Standard (EN), official publication, and acceptance into the legislation of the individual Member States.

The Directives concerning the protection of workers are:

- 89/391/EEC “Health and safety at work - Framework directive”
- 89/655/EEC “Use of work equipment”
  and amendments / additions

The Directives governing safety components are:

- 98/37/EEC “Machines Directive”
- 2006/95/EC, formerly 73/23/EEC, “Low Voltage Directive”
- 89/336/EEC “Electromagnetic Compatibility Directive”
  and amendments / additions

SAFETY IN THE WORKING ENVIRONMENT

THE MACHINES DIRECTIVE

The "Machines Directive" 98/37/EEC is meant for the manufacturers of machines and safety components, and has the following objectives:

- The definition of safety and health protection requirements for the improvement of the degree of protection offered to the operators of hazardous machinery.
- The design, construction and marketing in the European Union of safety machines and components complying with the minimum safety requirements laid down by the Directive itself.
- The free circulation in the Member States of machines and safety components complying with the Directive.

The Machines Directive:

- It applies to all new machines and safety components that are sold, lent or hired, and to used machinery in the event of sale, rental or loan.
- It sets forth the essential safety requirements relating to the design and construction of machines and safety components and it defines the respective certification procedures.
- It is mandatory for machines and for safety components. Only products conforming to the Directive can be marketed or commissioned in the European Union.

Certification procedures

The Directive:

- Lays down stringent procedures for safety components and highly hazardous machines which are listed in Annex 4.
- Lays down simplified procedures for low and medium risk machines not included in annex 4.
- Requires that manufacturers prepare a technical dossier for each product stating the safety principles adopted in the design, manufacture, transport, use and maintenance of the machine or the safety component.

Declaration of conformity

In order to certify the conformity of a product to the Directive, the manufacturer must:

- Affix the CE mark to the product.
- Attach the CE declaration of conformity attesting compliance to the Directive.

Note: the new Machines Directive 2006/42/EC will be in force starting from 29.12.2009 and will replace 98/37/EEC entirely.

SOCIAL DIRECTIVES

"Social Directives" 89/655/EEC and 89/391/EEC, are aimed at the improvement of safety in working environment.

The Directives:

- Determine the preventive measures to be adopted in the working environment.
- Supply information on:
  - risk analysis,
  - program of prevention and achievement of compliance of the machines,
  - procedures concerning the compliance of machines,
  - responsibilities of the employer,
  - education and training of the people in charge of system operation.
- Imposes the adaptation of existing machinery in compliance with the provisions of the Machine Directive on Machines within 1997

SAFETY IN THE WORKING ENVIRONMENT

LOW VOLTAGE DIRECTIVE

2006/95/EC, formerly 73/23/EEC is aimed at:

Ensuring that electrical materials are designed and manufactured so as to guarantee the protection of people against any risk of injury arising from the use of such materials. This Directive applies to all electrical materials meant for use at a nominal voltage of between:

- 50V and 1000V for alternating current.
- 75V and 1500V for direct current.

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

The aim of "Electromagnetic Compatibility Directive" 89/336/EEC is to ensure that electrical devices are designed and manufactured so that:

- Electromagnetic emissions are limited and low enough to permit other electrical devices to operate according to their intended purpose.
- The level of built-in immunity to external disturbances enables them to operate according to their intended purpose.

This Directive applies to all electrical and electronic devices able to cause electromagnetic disturbances and whose operation can be affected by external factors.

ACCREDITED BODIES

In each Member State, the role of the accredited Bodies is to assess and verify the compliance and the application of the Directives concerning machines and safety components.

Each State is responsible for the appointment and control of its own Bodies.

The Accredited Bodies must have the expertise and the resources which are necessary to perform their activities of inspection, analysis, technical support, measuring, etc...

NOTIFIED BODIES

Notified Bodies are authorized to examine and certify machines and safety components in compliance with the applicable Directives.

Each Member State of the European Union is required to:
- Appoint the Notified Bodies by specifying their tasks.
- Submit a list of the Notified Bodies to the European Commission and to the other Member States.

The European Commission publishes a Directory of all the Notified Bodies on the Official Journal of the European Commission, together with a list of the services, the machines and/or the safety components on which they are authorised to intervene.

The Member States of the European Union must make sure that these Bodies respect specified ethical and technical criteria.

SAFETY IN THE WORKING ENVIRONMENT

HARMONIZED STANDARDS

- They are technical Standards conceived to meet the essential requirements of the Directives.
- They are written by the various technical committees on a mandate by the Commission of the European Union.
- They are approved and adopted:
  - by the CEN (European Committee for Standardization)
  - or the CENELEC (European Committee for Electrotechnical Standardization)
- Then they are translated and published in the Official Journal of the European Committee and the Official Gazette of each Member State.

Status of the Standards

- **prEN...** a proposed standard (draft) which has not yet been definitely approved.
- **EN...** an approved standard already in force.
- **TS...** a technical specification.

The European Standards concerning safety are subdivided into 3 groups:

TYPE A STANDARDS

They specify the general design principles applying to all types of machine:

e.g... • **EN 292** safety of machines - basic concepts and general design principles.
- **EN 1050** risk assessment.

TYPE B STANDARDS

They are divided into two classes:

- type B1 Standards: concerning a specific aspect of safety

e.g... • **EN 999** positioning of protective equipment with respect to approach speeds of parts of the human body.
- **EN 294** safety distances for the protection of the upper limbs.
- **EN 60204-1** safety of machinery. Electrical equipment of machine.
- **EN 954-1** (will eventually be replaced by **EN 13849-1** after an overlap period of 3 years) elements of safety related control systems.

- type B2 Standards: concerning safety devices

e.g... • **EN 61496-1** electro-sensitive protective equipment - general requirements and tests.
- **EN 61496-2** electro-sensitive protective equipment- Particular requirements for equipment using active optoelectronic protective devices (i.e. light curtains).
- **EN 61496-3** electro sensitive protective equipment-Particular requirements for Active Optoelectronic Devices responsive to diffuse reflection (i.e. laser scanner).
- **EN 418** emergency stop devices.

TYPE C STANDARDS

They concern specific types of machine.

e.g... • **EN 692** mechanical presses.
- **EN 693** hydraulic presses.
- **EN 415** packaging machines.
- **EN 415-4** palletising and de-palletising systems.
- **EN 10218-1** industrial robots.

SAFETY IN THE WORKING ENVIRONMENT

NORTHERN AMERICAN APPROACH

NORTHERN AMERICAN STANDARD AND TEST BODIES

The Body overseeing health and safety of the workplace and machine safety in the USA is the **Occupational Health and Safety Administration (OSHA)**. Furthermore, individual states may have their own safety organizations enforcing regulations which can be stricter than the ones provided by OSHA.

OSHA oversees the application of laws and regulations which are in force at a federal level and, in its turn, issues safety Standards concerning the use and the construction of safety devices and/or machine tools.
An important example of OSHA Standard is OSHA 1910.217 - Mechanical Power Presses - where, among other things, the concept of Control Reliability is introduced.

Control Reliability is the ability of the safety system to continue working properly in the presence of a single fault, alongside with detecting the fault through self monitoring. A control reliable system is equivalent to a category 3 or a category 4 system according to the European approach.

The **American National Standard Institute (ANSI)** issues Standards about the safety of machine tools or about particular aspects of their operation or of their construction. For their development, ANSI often relies on the contribution of voluntary consensus associations, such as the **Robotic Industry Association (RIA)** or the **Association for Manufacturing Technology (AMT)**.

Examples of relevant ANSI Standards:

B11 Standards, such as:
B11.1 - Mechanical Power Presses.
B11.2 - Hydraulic Power Presses.
B11.3 - Power Press Brakes.
B11.4 - Shears.
B11.19 - Performance Criteria for the Design, Construction, Care and Operation of Safeguarding
When Referenced by other B11 Machine Tool Safety Standards.

Other ANSI Standards:

B20.1 - Conveyor Belts .
ANSI/RIA R15.06 - Safety Requirements for Industrial Robots.

Underwriters Laboratories Inc. (UL) is a not-for-profit organization that lists industrial components which have been tested and have proved to be safe and reliable concerning parameters such as electrical safety and fire resistance. UL lists safety components such as light curtains and laser scanners as well, based on its own Standards which are normally derived from international IEC Standards such as **IEC 61496**. Furthermore, the embedded safety software might be tested too, in accordance with Standard **UL 1998**. UL can certify the compliance with Canadian safety regulations as well, on behalf of CSA (thus issuing the C-US UL mark).

The **Canadian Standard Association (CSA)** The Canadian Safety Association (CSA) is the main Canadian Standardization body, which also acts as a testing laboratory to certify the compliance to the Canadian national regulations of safety components.

As a Nationally Recognised Test Laboratory (NRTL), CSA is allowed to test the compliance of all products under OSHA jurisdiction, as well as to provide the CSA NRTL/C mark, an equivalent of the C-US UL mark, which applies for example to light curtains.

The Canadian provinces are developing their own set of Standards and regulations as well. For example, **Regulation 7 of Ontario**, or Regulations for Industrial Establishment define a set of rules concerning the Pre-start Health and Safety Review (PHSR). PHSR is a preliminary examination which permits to assess the compliance of a new plant or machine to the existing regulations. It foresees the issue of a written report which helps the manufacturer to create protections in a well-tried and standardized way, and to have warranties about being compliant.

SAFETY IN THE WORKING ENVIRONMENT

AUSTRALIAN APPROACH

AUSTRALIAN STANDARD AND TEST BODIES

Established in 1922 Standards Australia is recognized by the Australian Government as the peak non-government standards development body. It is a company with 72 members, representing groups interested in the development and application of standards and related products and services.

Standards Australia develops and maintains around 7000 Australian Standards and related publications, which are prepared by over 1500 committees, with over 8000 members, and is Australia's representative on the ISO, IEC and PASC.

The Australian Standards for safety of machinery are based upon and also reference EN, ISO and IEC standards with minor changes to suit Australian requirements.

A similar hierarchy is followed as per the European Standards.

Examples of type A and B standards are:

AS 4024.1-2006 - Safety of machinery.
AS 4024.2-1998 - Safeguarding of machinery - Installation and commissioning requirements for electro-sensitive systems - Optoelectronic devices.
AS 4024.3-1998 - Safeguarding of machinery - Manufacturing and testing requirements for electro-sensitive systems - Optoelectronic devices.
AS 60204.1-2005 - Safety of Machinery - Electrical equipment of machines - General requirements.
AS 62061-2006 - Safety of Machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems.
AAS 61508.0-2006 - Functional safety of electrical / electronic / programmable electronic safety-related systems.

Australia also has a number of **type C standards**, for example:

AS 1219-1994 - Power presses - Safety requirements.
AS 1755-2000 - Conveyors - Safety requirements.
AS 2939-1987 - Industrial robot systems - Safe design and usage.
AS 1893-1997 - Code of practice for the guarding and safe use of metal and paper cutting guillotines.

Local OH&S regulations and codes or practices also need to be taken into consideration.

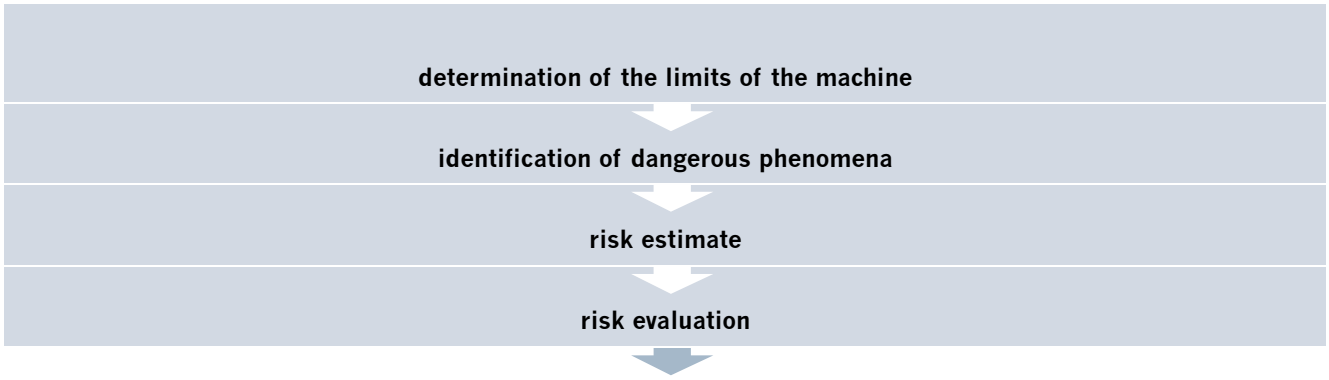
SAFETY IN THE WORKING ENVIRONMENT

RISK ASSESSMENT

The European Standard **EN 1050** puts forward a systematic procedure for the examination of the hazards associated with machinery with the aim of selecting and adopting the most suitable safety measures to reduce or eliminate the risks.

For USA an equivalent procedure is described in the **ANSI Technical Report B11.TR3**.

The risk assessment can thus be broken down into 4 stages:


determination of the limits of the machine
identification of dangerous phenomena
risk estimate
risk evaluation
purpose: elimination or reduction of risk

1. Determination of the limits of the machine
Consists in the examining of the intended use and of all the reasonably foreseeable misuses in relation to the level of training, experience and attitude of the user.

2. Identification of the hazards
Consists in the listing of:
- The risks and the hazardous elements (mechanical, electrical, chemical, etc.).
- Hazardous situations (manual loading-unloading, access to the system, etc.).
- Events that might cause damages (machine failures or anomalies).

During all phases of the machine life cycle up to the decommissioning and dismantling.

3. Risk estimation
Each hazardous situation identified is derived from a combination of the following elements:
- Severity of injuries or damage to health (reversible, irreversible, fatal).
- Probability of occurrence of that injury, which is a function of frequency and duration of exposure to danger.
- Possibility of avoiding danger with reference to:
  - rapidity of occurrence of the event,
  - possibility by the operator to perceive hazards and react promptly,
  - possibility to escape.

4. Risk evaluation
Following the risk estimation a risk evaluation is required to determine if a risk reduction is necessary or whether safety has been achieved. If risk reduction is required, the protective measures selected and applied shall be evaluated to determine if an adequate risk reduction has been achieved.

SAFETY IN THE WORKING ENVIRONMENT

EUROPEAN APPROACH

Safety Categories

Since, for different machines or different parts of a machine, the risk assessment might lead to different risk levels, it is necessary to establish the safety level of the measures to be adopted in proportion to the risk.

The Standard **EN 954** defines the categories of safety related parts according to the following parameters:
- Severity of damage (reversible, irreversible, fatal).
- Frequency and duration of exposure to the danger.
- Possibility of avoiding danger.

The Standard also defines the behaviour of the safety related parts in the event of a failure:

Choice of safety category

S severity of damage
S1 light injury (normally reversible).
S2 severe injury (normally irreversible) or death of the person.

F frequency / duration of exposure to the hazard
F1 from rare to rather frequent and/or short exposure time.
F2 from frequent to continuous and/or long exposure time.

P possibility of avoiding danger
P1 possible in given conditions (escape or intervention of third parties).
P2 almost impossible (the phenomenon occurs swiftly).

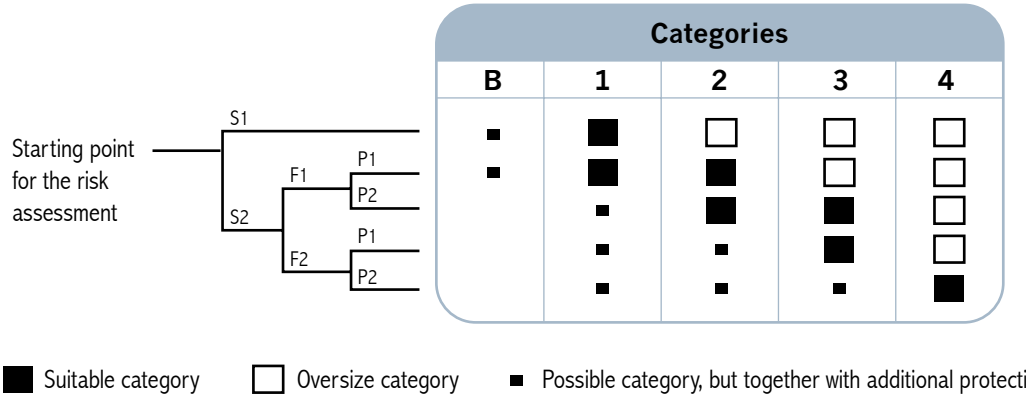


TABLE FOR CATEGORY SELECTION

- **When the chosen safety device is a safety light curtain, it can be either a type 2 or type 4, as provided for by the International Standard IEC 61496-1 and IEC 61496-2.**

- **When the chosen safety device is a laser scanner this can be only type 3 according to IEC 61496-1 and IEC 61496-3.**

Note: on a date still to be determined, **EN 954** is to be replaced by **EN 13849**, after an overlap period of 3 years.

SAFETY CATEGORIES

Category	Requirements	Behaviour	Safety principles
B	Devices designed, manufactured and combined in compliance with the reference Standards so as to be able to cope with foreseeable events.	A fault may result in the loss of the safety functions.	Use of selected components.
1	Same requirements as for category B, but with the use of reliable and well-tested safety principles and components.	A fault may result in the loss of the safety functions, but with lower probability than in category B.	
2	The requirements of category 1 apply. Moreover: The safety function of the device is based on cyclic control managed by the control system of the machine.	A fault may result in the momentary loss of the safety function. The fault is detected when performing the test before starting the next working cycle, and the start of a new machine cycle is disabled.	Use of structures and safety circuits able to detect the fault and stop the machine.
3	The requirements of category 1 apply. Moreover: A single fault shall not lead to the loss of the safety function. Whenever possible, the individual fault must be detected.	Not all faults can be detected. When an individual fault occurs, the safety function is always active. The build up of undetected faults may result in the loss of the safety function.	
4	The requirements of category 1 apply. Moreover: A single fault shall not result in the loss of the safety function. An individual fault is detected before or at the time of the request for the safety function. If this is not possible, the buildup of faults shall not lead to the loss of the safety function.	Fault detection shall occur in time to prevent the loss of the safety function.	

NORTHERN AMERICAN APPROACH

DEVICES GRADING

According to **OSHA 1910.217(B) (13)** ***control reliability*** is defined as the ability of a system to continue its safe operation in the presence of a single fault, while detecting it in the shortest possible time. Upon the detection of the fault, the system shall stop the dangerous machine and switch to a safe lockout condition, unless the fault is temporary and the system can be reset.

Using this definition, a Control Reliable system can fall in both categories 4 and 3.

AUSTRALIAN APPROACH

The general requirements for the Risk Assessment according to the Australian Standards are contained in AS 4024.1301-2006 Principles for Risk Assessment. Particular requirements concerning individual machines and / or applications can be furthermore found in specific regulations or standards.

PHOTOELECTRIC SAFETY LIGHT CURTAINS

CHARACTERISTIC ELEMENTS

Light curtains are electro sensitive devices using one or more light beams, emitted by an Emitter and received by a Receiver, to create an intangible area controlled.

• Safety type

- defines the self-monitoring and safety principles contained in the device
- it must be chosen as a function of the risk level characterising the machine

When the chosen safety device is a photo-electric barrier, the latter shall necessary belong to **TYPE 2** or **TYPE 4** as established by the International Standard **IEC 61496 1-2**.

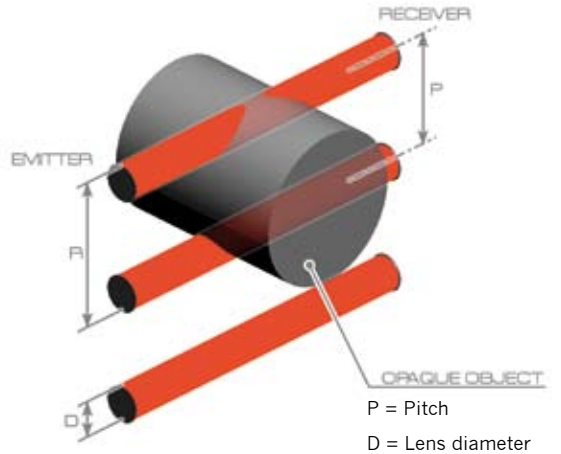
NOTE: why "Type" and not "Category"?

When talking about light curtains and laser scanners, we normally refer to their "safety type"; while for all other safety devices the term of choice is "safety category". This distinction is due to the International Standard IEC 61496, in which the term "type" is introduced to determine the safety level of optoelectronic protective equipment. In practice, "type" adds some optical requirements to the requirements which define categories for non-optical safety devices. Therefore, a type 2 light curtain is a light curtain which complies with the requirements for category 2 safety electronics and furthermore whose beams have certain characteristics, among which a given aperture angle, immunity to light interference and so on. The same applies for type 4 light curtains and type 3 laser scanners.
"Type" can be used in the same way as "category" is used to determine which device should fit into a given protection circuit. For example, a type 2 light curtain connected with a category 2 control system forms a category 2 protection circuit. If the control system is category 3, a type 2 light curtain will downgrade it to category 2, while a type 4 light curtain or a type 3 laser scanner will keep it in category 3. Only a type 4 light curtain will keep a category 4 safety circuit in category 4.

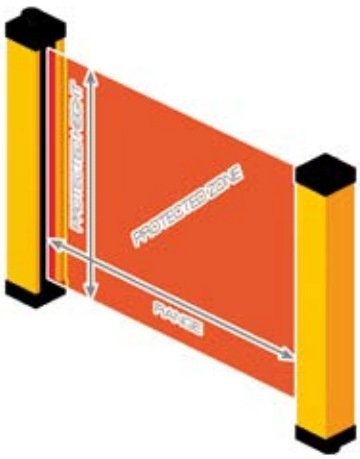
• Resolution

The resolution of a light curtain is the minimum size of an object that, placed into the controlled area, will obscure the controlled zone and hence stop the hazardous movement of the machine.

- Single beam light barriers: their resolution **R** is the same as the diameter of the lens — **R = D**
- Multibeam light curtains: their resolution **R** is the same as the sum of the lens diameter + the distance between two adjacent lenses — **R = P+D**



P = Pitch
D = Lens diameter
R = Resolution = P+D



• Protected height

This is the height controlled by the light curtain.
If it is positioned horizontally, this value shows the depth of the protected zone.

• Range

This is the maximum working distance that may exist between the emitter and the receiver. When deflection mirrors are used, it is necessary to take into account the attenuation factor introduced by each of them, which it is about 15%.

• Response time

This is the time it takes for the light curtain to transmit the alarm signal from the time the protected zone is interrupted.

PHOTOELECTRIC SAFETY LIGHT CURTAINS

ADVANTAGES OF LIGHT CURTAINS

- Effective protection in the event of fatigue, or distraction of the operator.
- Increase in the productive capacity of the machine, as the light curtain does not require the manual handling of physical guards or waiting for them to open.
- Faster machine loading/unloading operations.
- Reduced times of approach to the working areas.
- Elimination of the risk of tampering since any irregular intervention on the light curtain stops the machine.
- Simple and quick installation, with greater flexibility of adjustment on the machine, even in the case of subsequent repositioning.
- Possibility to build up large sized protections, either linear or along a perimeter, on several sides, at greatly reduced costs.
- Facilitated and fast maintenance of the machine, as there is no need to remove physical guards, such as grids, gates, etc.
- Improved appearance and ergonomic effectiveness of the machine..

CONDITIONS OF USE

For the photoelectric safety protections to be effective, it is necessary to verify that:

- It must be possible to electrically interface them to the control unit of the machine.
- It must be possible to stop the hazardous movements of the machine at once. In particular, it is important to know the machine stopping time to place the light curtain at the correct distance.
- The time taken to reach the hazardous point must be greater than the time necessary to stop the hazardous movement.
- The machine must not create secondary dangers due to the projection or fall from above of materials. If this danger exists, additional protections of a mechanical nature have to be provided.
- The minimum size of the object to be detected must be equal to or greater than the chosen light curtain resolution.

PHOTOELECTRIC SAFETY LIGHT CURTAINS

SELECTION CRITERIA OF A SAFETY LIGHT CURTAIN

1.Definition of the zone to be protected.

2. Definition of the parts of the body to be detected:
- fingers or hands
- approaching body of a person
- presence of a person in a hazardous area

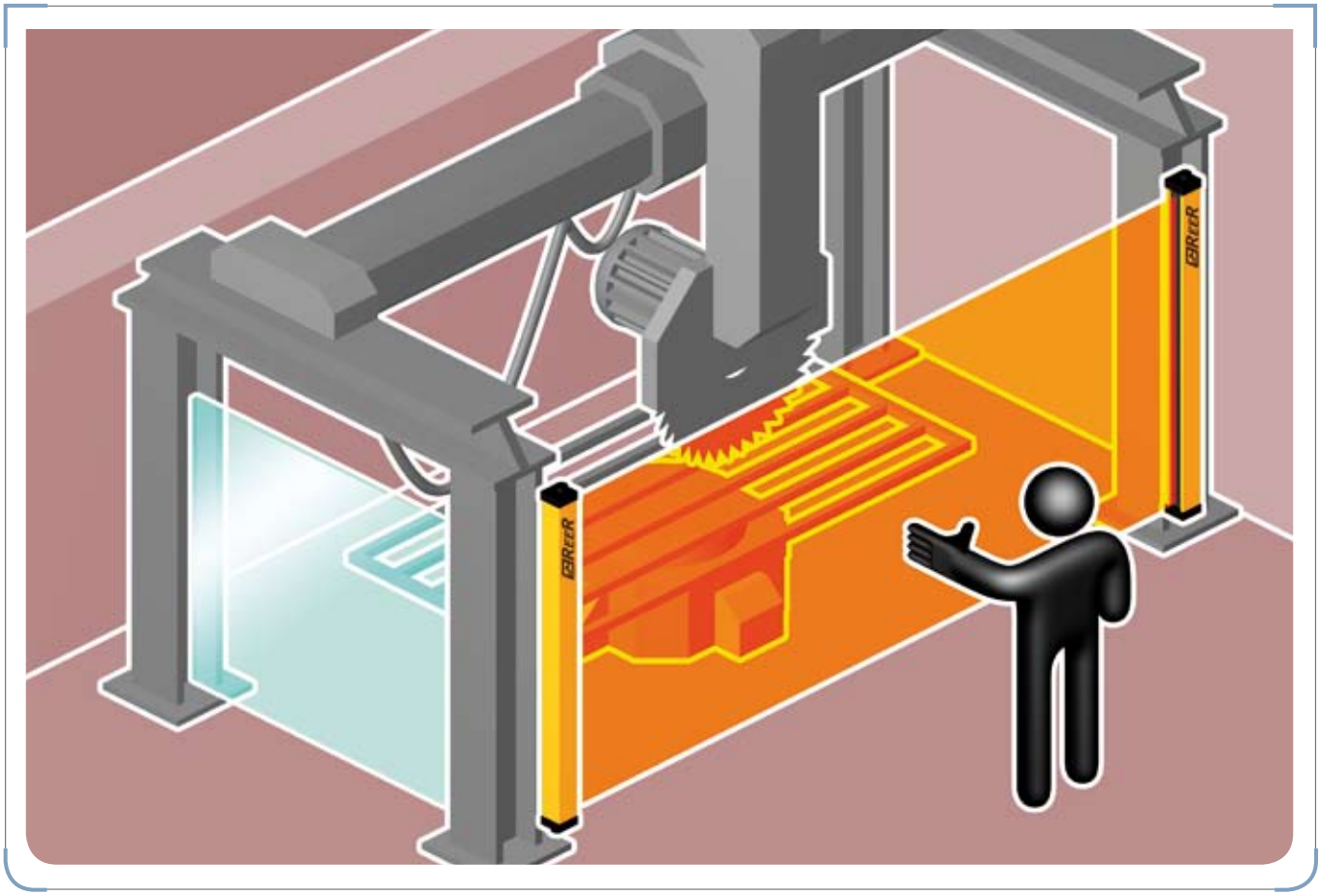
3. Definition of the safety distance between the light curtain and the hazardous point.

4. Definition of the safety category (Type) to be adopted.
(See page 11 "Choice of the safety category")

Definition of the zone to be protected

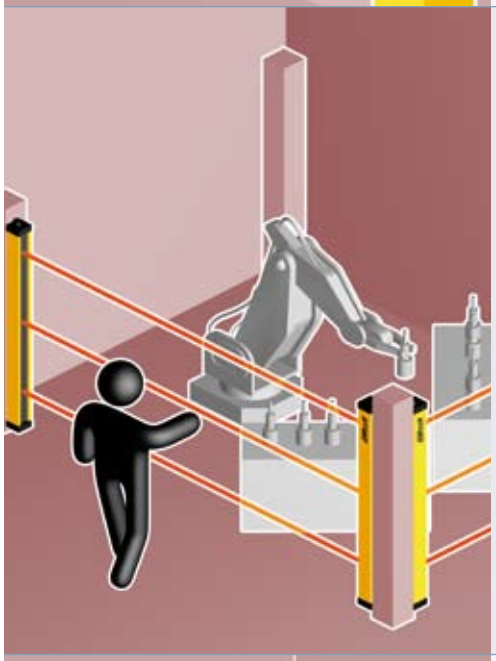
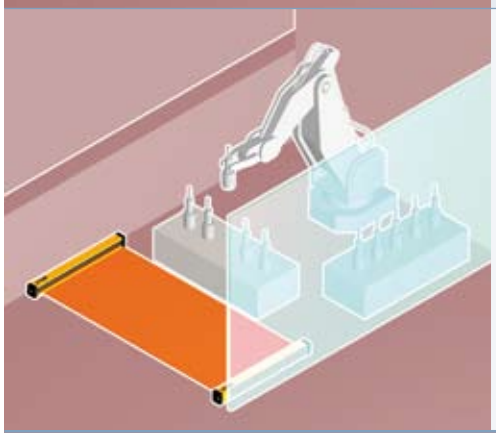
- Take into account the configuration of the zone:
  - shape and dimensions: width and height of the access area
  - positions of hazardous parts
  - possible access points
- The light curtain must be positioned so as to prevent the access to the dangerous area from above, from below, and from the sides without having intercepted the field protected by the light curtain.

It is possible to install one or more deflection mirrors in order to protect areas with access from several sides. This results in a considerable reduction in costs, as this solution eliminates the need of installing many separate light curtains.



PHOTOELECTRIC SAFETY LIGHT CURTAINS

DEFINITION OF TYPE OF DETECTION

	Detection	Characteristics	Advantages
	Finger or hand	Detection necessary when the operator must work close to the danger. Barrier resolution must be less than or equal to 40 mm.	Possibility to lower the dimensions by reducing at the top the space between the protection and the dangerous zone. Short time for machine charging and discharging. Less operator fatigue, more productivity.
	**Body**	Ideal detection for access control and protections of several sides, also for long scanning distances. The barrier must be placed at least at 850 mm from the danger. Barrier normally composed by 1-2-3-4 beams with resolution higher than 70 mm.	Protection costs reduced by the restricted number of beams. Possibility to protect zones with big dimensions by using deflection mirrors. It must be considered a possibility that a person may remain undetected between the barrier and the danger. In this case it is necessary to foresee supplementary safety measure for instance: place the machine's push button controls so as to make the dangerous zone visible and see that it is not possible for someone inside the dangerous zone to reach them.
	**Presence in a dangerous zone**	Detection realized by positioning the light curtains horizontally to control continuosly the presence of an object in a definite zone. The light curtains resolution depends on the height of the detection plane, anyway it cannot be higher than 116 mm.	Possibility to control zones not visible from where the machine's push button controls are located.

PHOTOELECTRIC SAFETY LIGHT CURTAINS

EUROPEAN APPROACH

DETERMINATION OF THE SAFETY DISTANCE

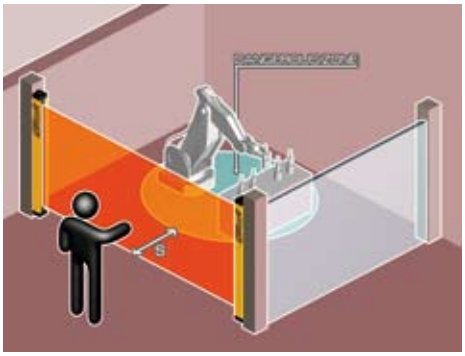
The effectiveness of the protection depends greatly on the correct positioning of the light curtain with respect to the danger.
The light curtain must be located at a distance greater than or equal to the minimum safety distance, S, so that reaching the dangerous point will be possible only when the dangerous action of the machine has been stopped.

The light curtain must be positioned so that:
- It is impossible to reach the dangerous point without going through the zone controlled by the light curtain.
- A person cannot be present in the dangerous zone without his/her presence being detected. To this end, it might be necessary to resort to additional safety devices (i.e..: photoelectric light curtains arranged horizontally).

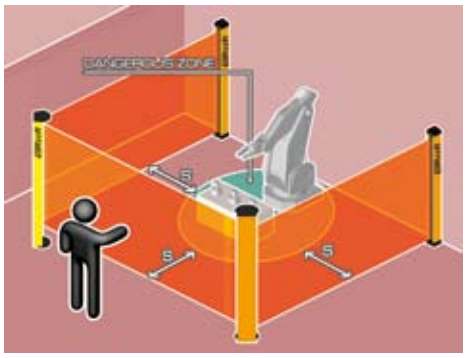
European Standard **EN 999** provides the elements for the determination of the safety distance.

If the machine in object is governed by a specific C type Standard, the latter shall be taken into due account.

If the distance **S** determined in this manner is too big, it is necessary:
a) to reduce the total stopping time of the machine,
b) to improve the detection capability (resolution) of the light curtain.



One-side protection



Three-side protection using deflection mirrors

GENERAL FORMULA FOR THE DETERMINATION OF THE MINIMUM SAFETY DISTANCE

$$S = K \times T + C$$

S	minimum safety distance between the protection and hazardous point, expressed in mm.
K	speed of approach of the body or parts of the body, expressed in mm / sec.
T	total stopping time of the machine, consisting of: **t1** reaction time of the protective device in seconds **t2** reaction time of the machine in seconds, until it stops the hazardous action.
C	an additional distance which is based on the possibility of the body or part there of being introduced into the hazardous area before the activation of the protective device, expressed in mm.

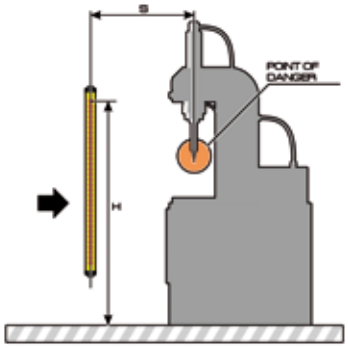
PHOTOELECTRIC SAFETY LIGHT CURTAINS

DETERMINATION OF THE SAFETY DISTANCE

direction of approach perpendicular to the protected plane with α=90° (± 5°)

Light curtains with resolution equal to or lower than 40 mm for the detection of hands and fingers

D≤40



S=2000xT+8x(D-14)

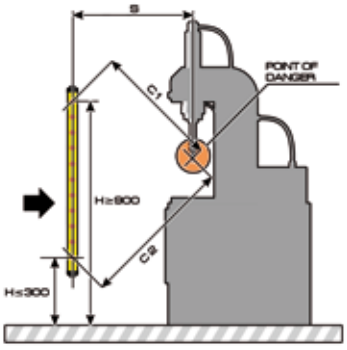
if **S**>500 then

S=1600xT+8x(D-14)

- The distance **S** must not be lower than 100 mm.
- If the distance **S** is greater than 500 mm it is possible to re-calculate the distance through the following formula.
- In these circumstances, the distance must in no case be lower than 500 mm.
- If there is a possibility of reaching the hazardous point by going over the light curtains, it becomes necessary to define the height of the uppermost beam in accordance with Standard **EN 294**.

Light curtains with a resolution greater than 40 mm and less than 70 mm for detection of arms and legs.

40<D≤70

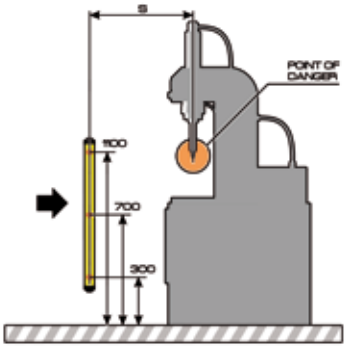


S= 1600xT+850

- The height of the detection zone has to be set so that C1 and C2 are sufficient to prevent reaching over or under the detection zone.
- The height of the lowermost beam must be equal to or lower than 300 mm.
- The height of the uppermost beam must be equal to or higher than 900 mm.
- If there is a possibility of reaching the hazardous point by going over the Light curtains, it becomes necessary to define the height of the uppermost beam in accordance with Standard **EN 294**.

Light grids for body detection through access control with a resolution of over 70 mm.

D>70



S= 1600xT+850

Number and height of the beams

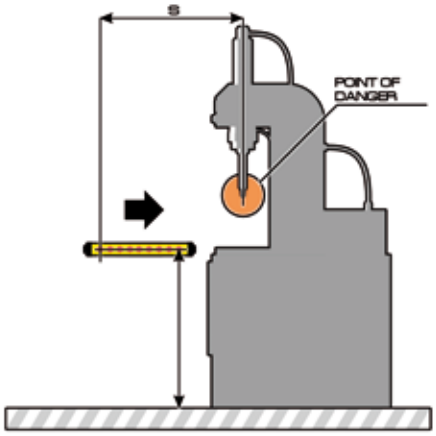
N.	recommended height
2	400 - 900 mm
3	300 - 700 - 1100 mm
4	300 - 600 - 900 - 1200 mm

PHOTOELECTRIC SAFETY LIGHT CURTAINS

DETERMINATION OF THE SAFETY DISTANCE

direction of approach parallel to the protected plane with α=0° (± 5°)

Horizontal light curtains for presence control in a dangerous area.



S=1600xT+(1200-0,4xH)

- (1200 - 0,4 x H) must be equal to or greater than 850 mm.
- The height H depends on the resolution D of the light curtains and is determined through the following formula:

  H = 15 x (D - 50)

- This can also be used to determine the maximum resolution that can be used at the different heights

  D = H / (15 + 50)

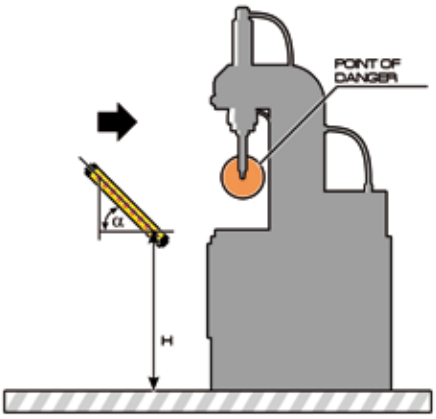
- Knowing that maximum height H must be 1000 mm, the maximum resolution limits will be:

  for H = 1000 mm D = 116 mm
  for H = 0 mm D = 50 mm

- If H is greater than 300 mm, at the stage of risk assessment it becomes necessary to take into consideration the possibility of access from beneath the beams.

direction of approach angled to the protected plane with 5°<α<85°

Slanted light curtains to detect hands and arms and for presence control in the dangerous area.



- With angle α >30° refer to the case of approach perpendicular to the protected plane.

- The distance S refers to the closest beam to the hazardous point.

- With angle α <30° refer to the case of approach parallel to the protected plane.

- The distance S refers to the beam farthest away from the hazardous point.

- The height of the beam away farthest from the hazardous point must not be greater than 1000 mm.

- For the determination of height H or resolution D apply the following formulas to the lowermost beam:

  H = 15 x (D - 50)
  D = H / (15 + 50)

PHOTOELECTRIC SAFETY LIGHT CURTAINS

NORTHERN AMERICAN APPROACH

DETERMINATION OF SAFETY DISTANCE

The general requirements for the calculation of the safety distance according to the USA regulations are contained in ANSI B11.19-1990, as well as in the U. S. Code of Federal Regulations (Volume 29 (29CFR), Part 1910, Subpart O "Machine Safeguarding"). Particular requirements concerning individual machines and/or applications can be furthermore found in specific regulations or Standards.

According to the general rules, the formula for the calculation of the safety distance is the following:

GENERAL FORMULA FOR THE DETERMINATION OF THE MINIMUM SAFETY DISTANCE (USA)

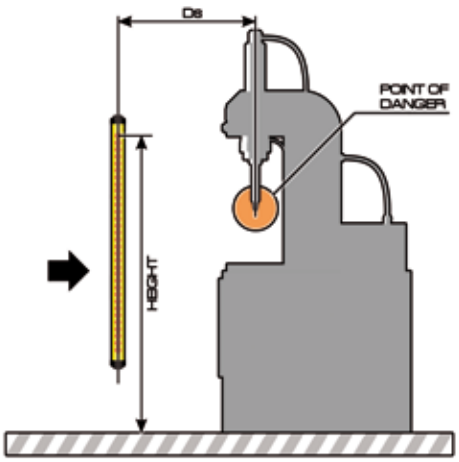
$$D_S = H_S \times (T_S + T_C + T_R + T_{BM}) + D_{FF}$$

D_S	the **minimum safety distance** (in inches or mm) from the hazardous zone to the detection point, plan or zone
H_S	the **hand speed constant**, that is a parameter (in inches or mm) deriving from the data available on the approach speeds of the human body or its parts
T_S	the **machine stopping time** measured at the machine tool's final control element
T_C	the **control system response time**
T_R	**response time of the presence sensing device** and its interface
T_{BM}	additional response time allowed to the brake monitoring to compensate **brake wear**. Possible additional delay times have to be kept into account too
D_{PF}	**depth penetration factor**, that is an additional safety distance introduced in order to compensate for the intrusion inside the dangerous zone prior to the actuation of the ESPE Values vary between 0.25 inches to 48 inches or more, depending on the application. A typical formula for the calculation of the DPF in vertical applications (where the plane of the sensing field is perpendicular to the direction of approach) is: DPF (inches) = 3.4 x (Object sensitivity – 0.26), but not less than 0

PHOTOELECTRIC SAFETY LIGHT CURTAINS

EXAMPLE:

hand protection in a vertical application



- the light curtain response time is T_R = 7 ms
- the response time of the safety controller is T_S = 15 ms
- the machine stopping time is T_C = 100 ms
- the brake monitor response time is T_{BM} = 30 ms
- the *depth penetration factor is* D_{PF} = 1.8 inches

Considering a hand speed H_S = 63 inches per second and a light curtain object sensitivity = 20 mm = 0.79 inches:

D_S = 63 x (0.1 + 0.015 + 0.007 + 0.04) + 1.8" = 12.006 inches

- When using mirrors for perimeter safeguarding, take care that the safety distance is maintained on all the sides.
- The Blanking function usually increases the minimum object sensitivity. Thus the safety distance has to be recalculated. Be careful that also the D_{PF} parameter should be recalculated.

AUSTRALIAN APPROACH

DETERMINATION OF SAFETY DISTANCE

The general requirements for the calculation of safety distances according to the Australian Standards are contained in **AS 4024.2-1998** Safeguarding of machinery - Installation and commissioning requirements - Optoelectronic devices. Particular requirements concerning individual machines and / or applications can be furthermore found in specific regulations or standards

GENERAL FORMULA FOR THE DETERMINATION OF THE MINIMUM SAFETY DISTANCE (AUSTRALIA)

$$S = K \times T + C$$

S	minimum safety distance between the protection and hazardous point, expressed in mm.
K	speed of approach of the body or parts of the body, expressed in mm / sec.
T	total stopping time of the machine, consisting of: **t1** reaction time of the protective device in seconds **t2** reaction time of the machine in seconds, until it stops the hazardous action.
C	an additional distance which is based on the possibility of the body or part there of being introduced into the hazardous area before the activation of the protective device, expressed in mm.

PHOTOELECTRIC SAFETY LIGHT CURTAINS

MUTING FUNCTION

The Muting function is the provisional and automatic cut-out of the light curtain protective function in relation to the machine cycle. Muting can only occur in a safety condition.

This function proves indispensable when during the normal automatic cycle of a system the light curtain has to be interrupted by some of the machine parts or materials being processed, without resulting in the machine stoppage.

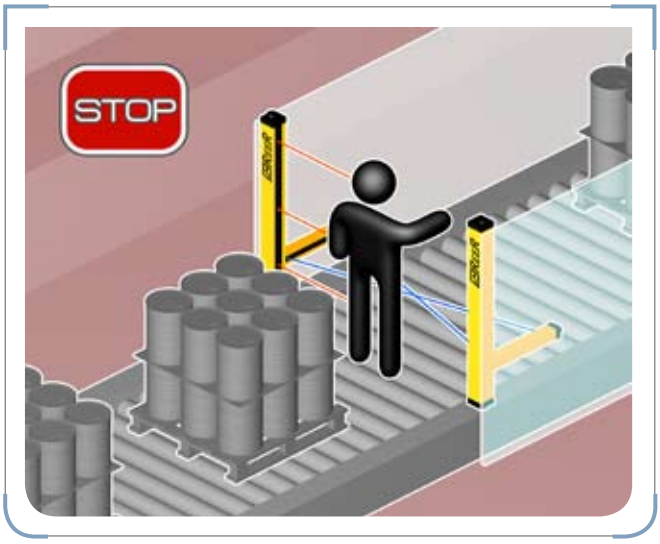
A typical instance of this is a palletising system, where the palletised product must be able to go through the gate controlled by the light curtain, whilst the passage of a person must stop the system at once.

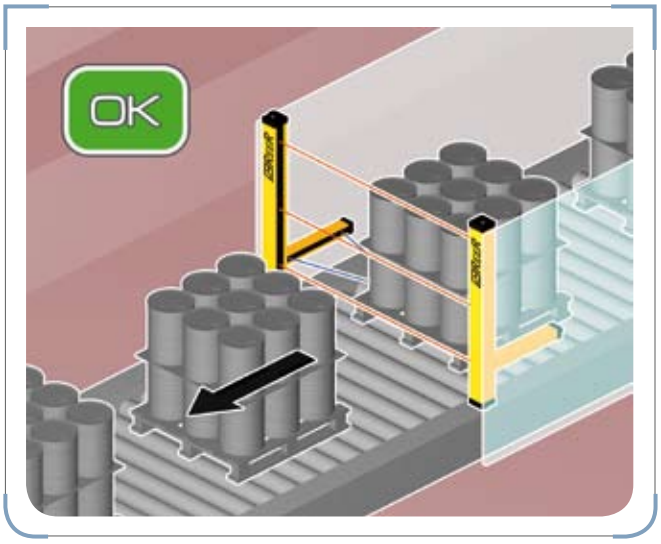
Therefore it is necessary to realise a safety system able to distinguish between:

- **materials authorized**
- **people non authorized**

to go through the light curtain

The Muting function can be present on both type 2 and type 4 safety light curtains.





PHOTOELECTRIC SAFETY LIGHT CURTAINS

MUTING – ESSENTIAL REQUIREMENTS - EUROPEAN APPROACH

The essential requirements regarding the Muting Function are described by the followings Standards:

IEC 61496-1 "Electro-Sensitive Protective Equipment"
EN 415-4 "Safety of the Machinery - automatic palletizing systems
IEC TS 62046 "Application of the protective equipment to detect the presence of persons"

- The activation of the Muting function must be fully automatic, i.e. it must not depend on the intervention of an operator.
- The Muting Function must recognize the material and distinguish between an object and an operator.
- The Muting must not be activated/de-activated through the transmission of a single signal. The presence of two distinct signals is therefore necessary.
- The Muting must not depend entirely on software signals. It is possible to combine a software signal and a hardware signal, or two hardware signals.
- The activation signals of the Muting function must follow a given sequence; an incorrect combination must prevent the activation of the Muting function or result in a machine stoppage.
- The duration of the Muting function should be limited to the time period during which the access to the controlled area is obstructed by the presence of the material going through the gate.
- The protective function of the light curtain must be restored immediately after the passage of the materials recognized by the Muting sensors as authorised to go through.
- In the event of an unwanted stop of the material in the zone controlled by the light curtain, the Muting function must be disabled and the machine stopped.

The removal of the fault and the resumption of the regular machine cycle shall be possible only through a deliberate reset action by means of a manual control, when the safety conditions have been restored.

MUTING – ESSENTIAL REQUIREMENTS - NORTHERN AMERICAN APPROACH

The Northern American and European approaches are very similar both in underlying concept and in detailed prescriptions.

The most relevant American Standard dealing with Muting is **ANSI B11.19-2003**.

According to it, the machine control system responsible for the Muting function (i. e. a safety module or the light curtain itself, if it integrates the muting function) has to be Control Reliable.

For this reason, if we stick to the European definitions, it is recommended to use only type 4 light curtains for Muting applications in the USA, whereas in Europe type 2 is also allowed (it has to be remembered once more that type 3 light curtains do not exist).

MUTING – ESSENTIAL REQUIREMENTS - AUSTRALIAN APPROACH

The general requirements for Muting according to the Australian Standards are contained in **AS 4024.2-1998** Safeguarding of machinery - Installation and commissioning requirements - Optoelectronic devices.

Particular requirements concerning individual machines and / or applications can be furthermore found in specific regulations or standards and also **AS4024.1904-2006** Displays, controls, actuators and signals-indication, marking and actuation-Requirements for visual, auditory and tactile signals.

BLANKING FUNCTION

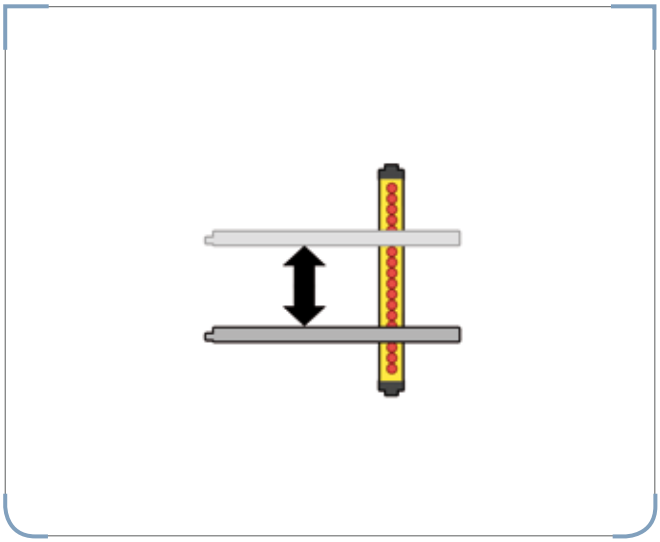
Blanking is an auxiliary function of safety light curtains for which the introduction of an opaque object inside parts of the light curtain's protection field is allowed without causing the stoppage of the machine. Blanking is only possible in the presence of determined safety conditions and in accordance with a configurable operating logic.
The blanking function is therefore particularly useful when the light curtain's protection field must be inevitably intercepted by the material being worked or by a fixed or mobile part of the machine. In practice, it is possible to keep the light curtain's safety outputs in an ON condition, and the machine working, even if a pre-determined number of beams within the protection fields are being intercepted.

Fixed Blanking allows a fixed portion of the protection field (i. e. a fixed set of beams) to be occupied, while all the other beams operate normally.

Floating Blanking allows the object to move freely inside the light curtain's protection field occupying a given number of beams, at the condition that the occupied beams are adjacent and that their number is not higher than the configured one.

Floating Blanking with compulsory object presence makes the light curtain work in a reverse way within the blanked portion of the protection field. That is, the blanked beams must be occupied during blanking and therefore the object has to be inside the protection field for the light curtain to remain in the ON state. In this case too the object can move freely within the protection field if the above conditions are respected.

Requirements for the blanking function can be found in the Technical Specification **IEC/TS 62046** describing additional means that may be required to prevent a person from reaching into the hazard through the blanked areas of the detection zone.



WARNING !

The use of the blanking function can be allowed depending on the characteristics of the application to be protected. Based on the risk analysis of your application, check whether the use of the blanking function is allowed for that particular application and with what features.

Reer SpA does not assume responsibility for the improper use of the blanking function nor for the possible damages deriving from it.

The use of the blanking function may need a recalculation of the safety distance due to the modified detection capability.

SAFETY LASER SCANNER

CHARACTERISTIC ELEMENTS

The Safety Laser Scanner is an electro-sensitive device for the protection of operators against the risk of accidents caused by industrial machines and plants with potentially dangerous moving parts and against possible collisions with Automatic Guided Vehicles (AGV).

For **EN 61496-3**, Laser Scanners must be certified in accordance to **type 3**.
Regarding the SIL level they have to comply with **SIL 2** as specified in **EN 61508**.

Using the Safety Laser Sensor, precise **programmable horizontal protected areas** of variable shape can be created (i. e. semi-circular, rectangular or segmented), suitable for all applications with no need of a separate reflective or receiving element.

It is also possible to use the Laser Scanner in a **vertical** mount for the protection of the access to a dangerous area.

Any person or object entering or remaining in the safety zone during survey causes, through the self-monitored static safety outputs of the device, an emergency stop command to the control system of the protected machine. The machine's hazardous movement will thus be interrupted.

If the warning zone is instead occupied, thanks to a non-safety dedicated solid state output, a signal is sent to the machine control system, which can be used to activate a light or a sound signal in order to prevent operators to break into the safety zone and stop the machine. Or, on an AGV application, the warning signal can be used to slow the vehicle down, so that a possible further break of the safety zone will not force it to stop abruptly, thus reducing the mechanical wear of the AGV.

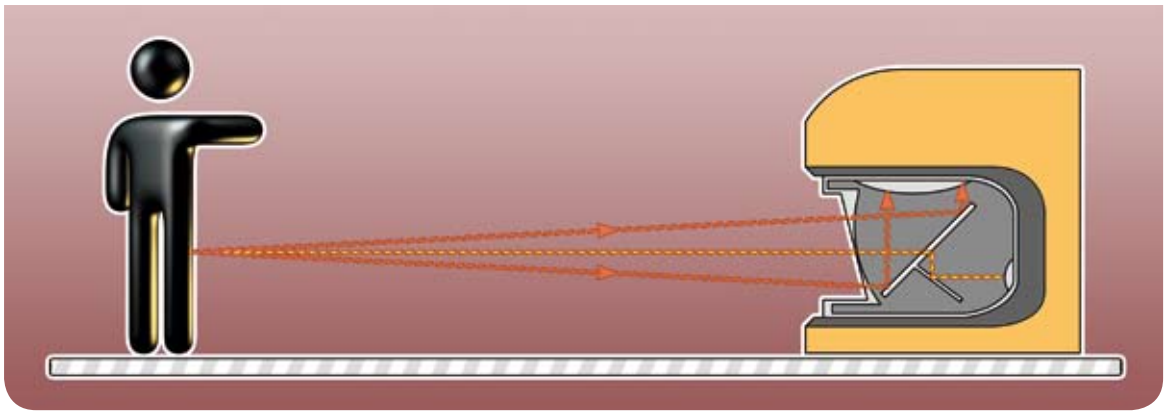
The profiles of the controlled areas, as well as all the other configurable parameters, are programmable through a dedicated user interface software, installed on a laptop or pc and connected with the scanner via a serial interface.

SAFETY LASER SCANNER

PRINCIPLE OF OPERATION

The Safety Laser Scanner emits ultra-short infrared laser light pulses. If the emitted beam hits an obstacle inside the controlled zone, then part of the light is reflected back towards the point of emission.

With its state-of-the-art technology, the Laser Scanner is able to measure the time (billionth of second) taken by the light to travel across the space between the sensor and the obstacle and back and to convert it into a distance with a precision of 3 cm.

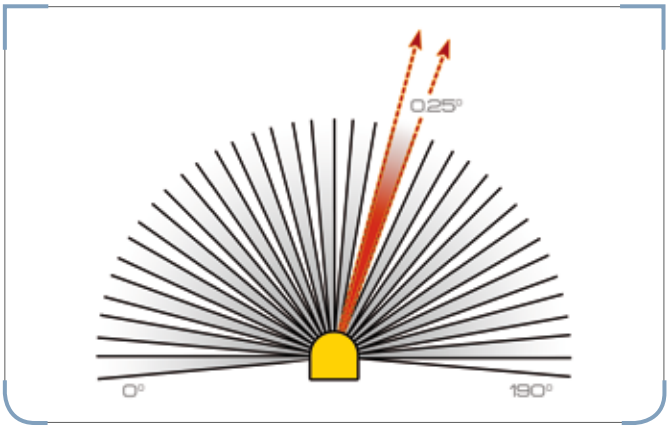


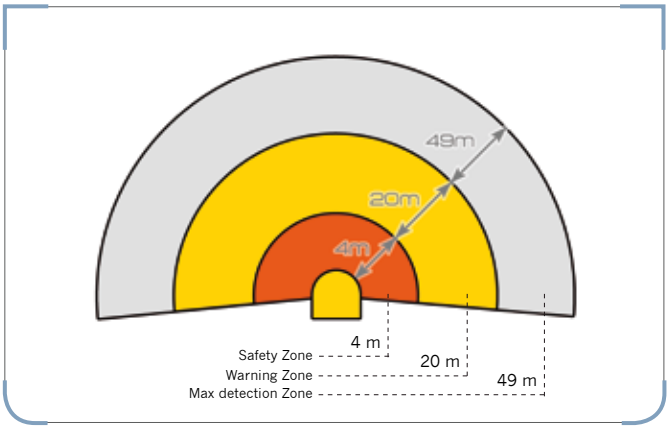
Using a rotating optical system, these measurements are made on a 190° semi-circular area every 0.25° for a total of 760 measurements per scan. The device performs 33 scans per second.

The Safety Laser Scanner creates a **controlled safety area with a maximum radius of 4 meters** and a **warning area with a maximum radius of 20 meters**. The safe detection of a person inside the safety zone is assured independently from the reflectivity of its clothes or skin.

The shape of the two controlled areas is fully programmable. Therefore, for each of the 760 measurements per scan, the laser scanner will compare the programmed distance to the measured distance.

If the measured distance is less than the programmed one, this means that an obstacle is inside the safety zone. A stop command will thus be sent to the machine.





SAFETY LASER SCANNER

CONTROLLED AREAS

SAFETY ZONE

This is the effective protection zone, in which the laser scanner assures the detection of any obstacle having a minimum reflectivity to infrared light of 1.8%. This means any human body in any possible clothing.
The occupation of this zone causes the switching of the two safety outputs that control the emergency stopping of the machine.
The shape of the zone can be programmed according to the application requirements.

WARNING ZONE

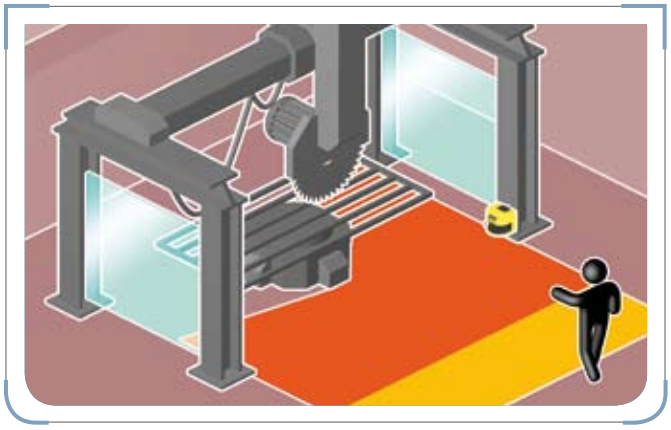
This is the zone in which the laser scanner is able to detect the presence of an obstacle approaching the safety zone.
The occupation of this zone causes the switching of the auxiliary output that can be used to activate light or sound signals or in order to slow down the hazardous movement. This zone is generally larger than the safety zone.
In this case also the shape of the zone can be programmed according to the application requirements.

ADVANTAGES OF THE LASER SCANNER

- No receiving and reflecting elements
- Simple programming of differently-shaped controlled areas
- Monitoring and protection of large areas
- Horizontal mount for the detection of the body in a dangerous area.
- Vertical mount for the detection of hands and arms or for the detection of the body in access control.
- Use on moving vehicles (AGVs)
- Measurement of object size, shape and position
- Fast and reliable installation

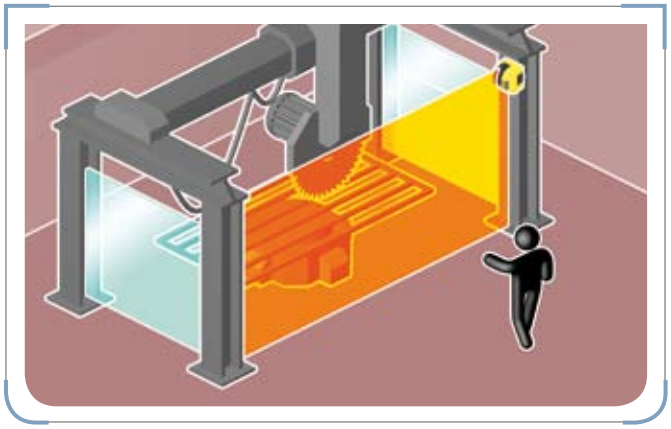
SAFETY LASER SCANNER

APPLICATIONS



Area control

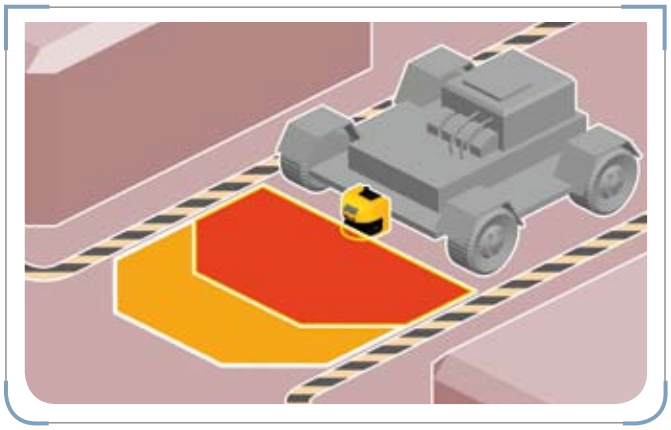
Example of an horizzontally mounted protective field permanently monitored by Pharo. In this way a larger area can be monitored through the detection of the lower limbs of the body.



Access control

If the controlled plane is installed in a vertical position, even very large accesses can be protected. Hands, arms or the whole body can be detected, depending on the chosen resolution.

Note: the contour detection is mandatory for the vertical mount / access control applications.



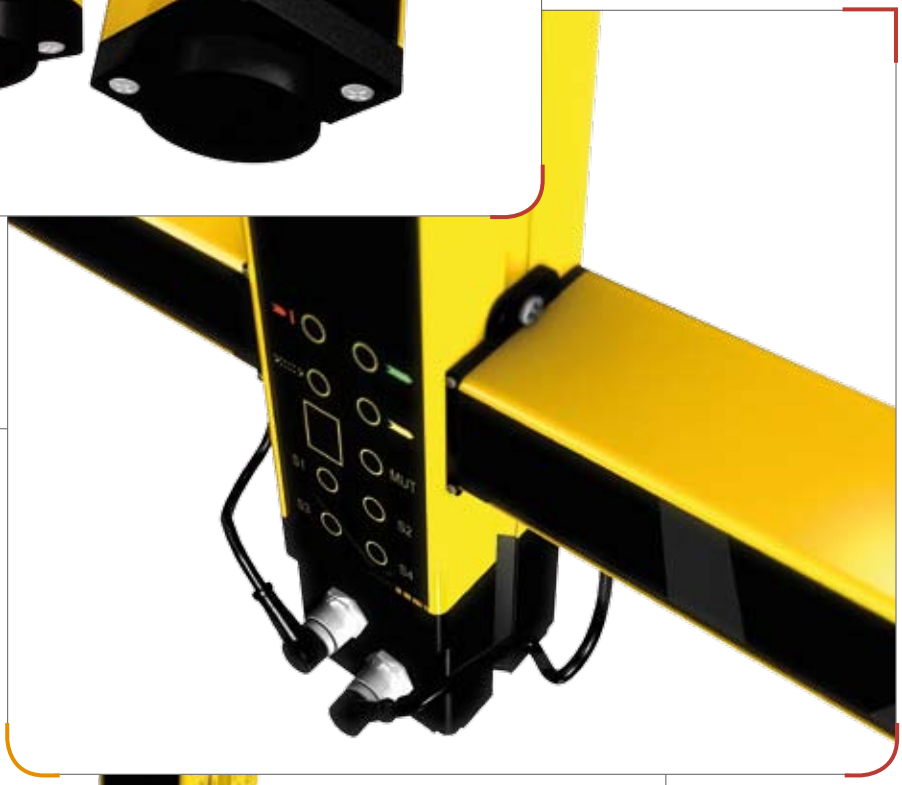
Protection of Automatic Guided Vehicles (AGV)

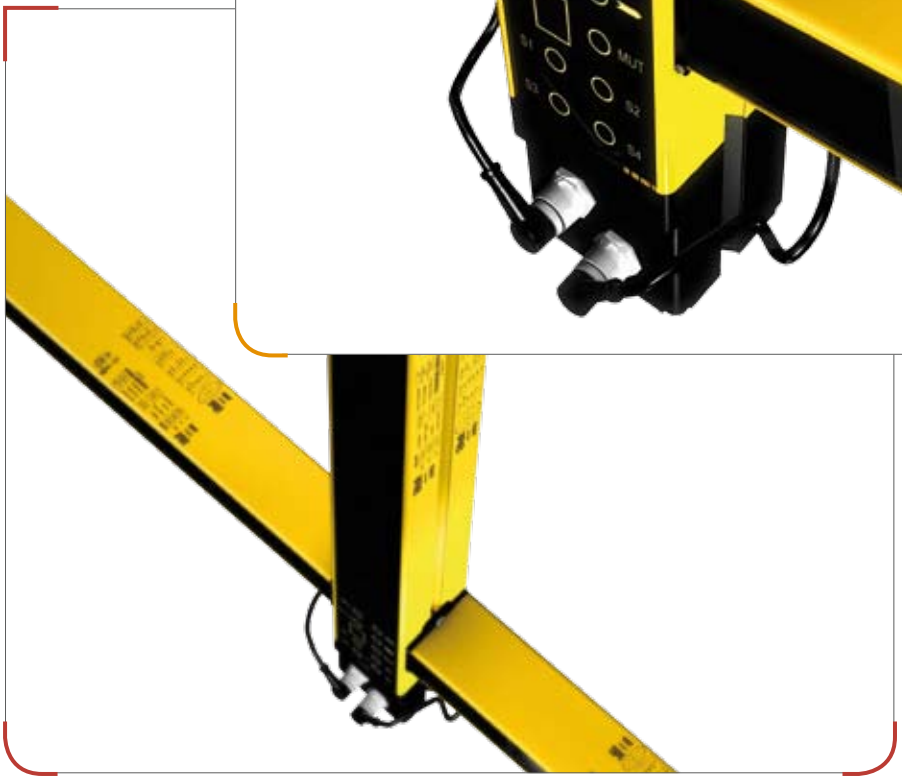
The vast size of the controlled area allows the AGV to travel at higher speeds with respect to bumper protection.
The warning area permits speed reduction in the presence of obstacles. The data measured by the sensor can be sent to the vehicle on the serial interface and used as navigation aid.

Dimensional measurement

The sensor is first of all a measurement device. Therefore, the measurement data of the surrounding environment, which are always available during operation, can also be used for object profile, position and dimensions measurement in industrial automation.

SAFETY SENSORS





SAFETY SENSORS

SELECTION GUIDE

Optoelectronic safety devices are ideally suited for the control of zones or areas where dangerous processes are carried out, as they ensure adequate protection to the people who might enter such areas or introduce their limbs into them.

It is therefore advisable to break down the applications of optoelectronic safety devices into four groups, which may be summarized as follows:

Finger detection

Hand detection

Detection of the presence of the body in a dangerous area

Detection of the body in access control

In the rest of the catalog, for each of the applications listed above, the appropriate solutions realized with the devices in the Reer range are presented.

Depending on the functions to be performed by the safety system, on the resolution required or on the maximum scanning distance, it is possible to select, among the different families of Reer's safety protective devices, the right tool for the safeguarding of dangerous machines.

SAFETY SENSORS

	ADMIRAL AD	ADMIRAL AX	ADMIRAL AX BK
Sensor	Light curtain	Light curtain	Light curtain
Safety type	4	4	4
Resolution (mm)	14	14	14
Protected heights mm	160÷1810	160÷1810	160÷1810
Max range m	5	5	5
Start/Restart Interlock	-	yes	-
EDM	-	yes	-
Blanking	-	-	yes, floating
Master/Slave	-	yes	yes, master

	ADMIRAL AD	ADMIRAL AX	ADMIRAL AX BK	JANUS M	JANUS J	PHARO	VISION V	VISION VX	VISION VXL	VISION MXL
Sensor	Light curtain	Light curtain	Light curtain	Light curtain	Light curtain	Laser Scanner	Light curtain	Light curtain	Light curtain	Light curtain
Safety type	4	4	4	4	4	3	2	2	2	2
Resolution (mm)	20-30-40	20-30-40	20-40	30-40	40	30-40	20-30-40	20-30-40	30-40	30-40
Protected heights mm	160÷1810	160÷1810	160÷1810	310÷1810	610÷1210	-	160÷1810	160÷1810	160÷1210	160÷1210
Max range m	18	18	18	16/60	60	2,6 (radius)	16	18	8	8
Start/Restart Interlock	-	yes	-	yes	yes	yes	-	yes	yes	yes
EDM	-	yes	-	yes	yes	yes	-	yes	yes	yes
Blanking	-	-	yes, floating	-	-	-	-	-	-	-
Muting	-	-	-	yes	-	-	-	-	-	yes
Master/Slave	-	yes	yes, master	-	-	-	-	yes	-	-
Long Range	-	-	-	yes (up to 60 m)	yes (up to 60 m)	-	-	-	-	-

	ADMIRAL AD	ADMIRAL AX	ADMIRAL AX BK	JANUS M	JANUS J	PHARO	VISION V	VISION VX
Sensor	Light curtain	Light curtain	Light curtain	Light curtain	Light curtain	Laser Scanner	Light curtain	Light curtain
Safety type	4	4	4	4	4	3	2	2
Resolution (mm)	50-90	50-90	40-90	40-90	40	50-70 selez.	50-90	50-90
Protected heights mm	310÷1810	310÷1810	310÷1810	310÷1810	610÷1210	-	310÷1810	310÷1810
Max range m	18	18	18	16/60	60	4 (radius)	16	18
Start/Restart Interlock	-	yes	-	yes	yes	yes	-	yes
EDM	-	yes	-	yes	yes	yes	-	yes
Blanking	-	-	yes, floating	-	-	-	-	-
Muting	-	-	-	yes	-	-	-	-
Master/Slave	-	yes	yes, master	-	-	-	-	yes
Long Range	-	-	-	yes (up to 60 m)	yes (up to 60 m)	-	-	-

SAFETY SENSORS

	ADMIRAL AD	ADMIRAL AX	JANUS M	JANUS J	PHARO	VISION V	VISION VX	VISION VXL	VISION MXL	ILION	ULISSE
Sensor	Light curtain	Light curtain	Light curtain	Light curtain	Laser scanner	Light curtain	Light curtain	Light curtain	Light curtain	Single beam	Single beam
Safety type	4	4	4	4	3	2	2	2	2	2	2
Number of beams	2-3-4	2-3-4	2-3-4	2-3-4	-	2-3-4	2-3-4	2-3-4	2-3-4	1-2-3-4	1-2-3-4
Resolution mm	-	-	-	-	150	-	-	-	-	-	-
Protected heights mm	510÷910	510÷910	510÷910	510÷910	-	510÷910	510÷910	510÷910	510÷910	-	-
Max range m	18	18	16/60	16/60	4 (radius)	16	18	8	8	8	6
Start/Restart Interlock	-	yes	yes	yes	yes	-	yes	yes	yes	yes [a, b]	yes [a, b]
EDM	-	yes	yes	yes	yes	-	yes	yes	yes	yes [a, b]	yes [a, b]
Muting	-	-	yes I,L,T models	-	-	-	-	-	yes	yes [b]	yes [b]
Master/Slave	-	yes	-	-	-	-	yes	-	-	-	-
Models with passive retroreflector elements	-	-	yes I,L,T models (3,5 / 6 m range)	yes (6 m range)	-	-	-	-	-	-	-
Long Range	-	-	yes (up to 60 m)	yes (up to 60 m)	-	-	-	-	-	-	-

a: with AUS X control unit
b: with AUS XM control unit

GLOSSARY

Start/Restart interlock: Interlock function (manual restart required) at machine start or restart.
EDM: External Device Monitoring: controls the switching of external contactors via feedback input.
Master/Slave: Two light curtains can be connected in cascade; all the outputs are managed by only one of these (Master).
Blanking: The light curtain can be programmed to ignore a single object of defined dimensions that may also be greater than the resolution (see page 11).
Muting: The protective function of the light curtain can be inhibited under certain safety conditions (see page 22).
I Models: Models with connections for external muting sensors.
L, T Models: Models with built-in muting sensors in pre-assembled kits for pallet outfeed only (L) or infeed/outfeed (T).

ADMIRAL

ADMIRAL

The **Admiral** Type 4 family of safety light curtains is the ideal solution for the protection of the majority of high-risk industrial applications.

Its features include:

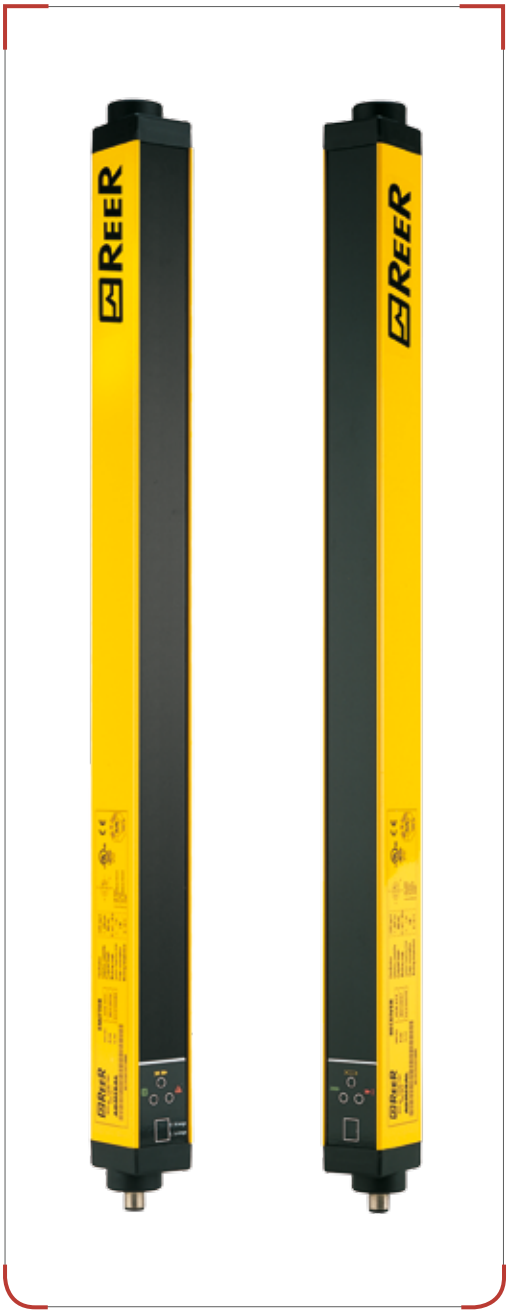
- Extremely **easy connection** and installation, thanks to the M12 connectors and the use of standard cables.
- **Integration of the main safety functions**, including self-monitoring of the safety circuits and, only for the AX models, the external device monitoring (EDM) and the Start / Restart interlock functions.
- The utmost **reliability** in the field, thanks to the rugged construction and to the high level of immunity to external interference (optical, EMC, etc.).
- The **breadth of the range**, including Master / Slave models for cascade connection of two or three light curtains, models with floating blanking, and the widest variety of heights and resolutions.

Each light curtain of the Admiral series can be connected to the dedicated ADSR safety interfaces of the Admiral series, or directly to contactors controlled by the light curtain, or to safety PLCs or suitable commercial safety modules.

New | Special WT versions in watertight housing (see page 45) are available.

New | The AS-i connection interface AS-i CI5 (see page 123) is now available.

Special models conforming to the **"ATEX Directive"** 94/9/EEC - Dust Zone 22 - Gas Zone 2 available on request.



ADMIRAL

THE ADMIRAL RANGE

ADMIRAL AD

- 7 types of detection:
  - resolution 14 mm for finger detection
  - resolution 20 - 30 - 40 mm for hand detection
  - resolution 50 - 90 mm for detection of the body in a hazardous area
  - 2 - 3 - 4 beams for detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Automatic restart
- Electrical connections with 5-pole M12 connectors

The ideal light curtain for a simple interface with safety modules or PLC.

ADMIRAL AX

- 7 types of detection:
  - resolution 14 mm for finger detection
  - resolution 20 - 30 - 40 mm for hand detection
  - resolution 50 - 90 mm for detection of the body in a hazardous area
  - 2 - 3 - 4 beams for detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Electrical connections with 5-pole M12 connector for emitter and 8-pole M12 connector for receiver
- Built-in manual or automatic restart, selectable
- Feedback input for control of external relays (EDM)

Master and Slave models for serial connection of two light curtains even of different height and resolution

The ideal light curtain for directly controlling and monitoring the circuits of the machine, without the need for external safety modules.
The Master / Slave models are also the ideal solution for connecting two light curtains in series to perform a combined detection of the hand and of the presence of the person or of two different sides of the machine.

ADMIRAL AX BK

- 4 types of detection:
  - resolution 14 mm for finger detection
  - resolution 20 and 40 mm for hand detection
  - resolution 90 mm for detection of the body in a hazardous area
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Electrical connections with 5-pole M12 connectors for emitter and 8-pole M12 connectors for receiver
- Automatic restart
- Built-in functions of floating blanking with 5 selectable configurations
- Master and Slave models for serial connection of two light curtains even of different height and resolution

The ideal light curtain for protecting press brakes, automatic machines and robotised areas, where the material being processed or moving parts of the machine cross the field protected by the light curtain.
With the blanking models with 14 and 20 mm resolution, it is also possible to have the Master/Slave function (present only on Master models) in a protection system composed of two light curtains connected in series and to perform a combined detection of the hand and of the presence of the person or of two different sides of the machine.

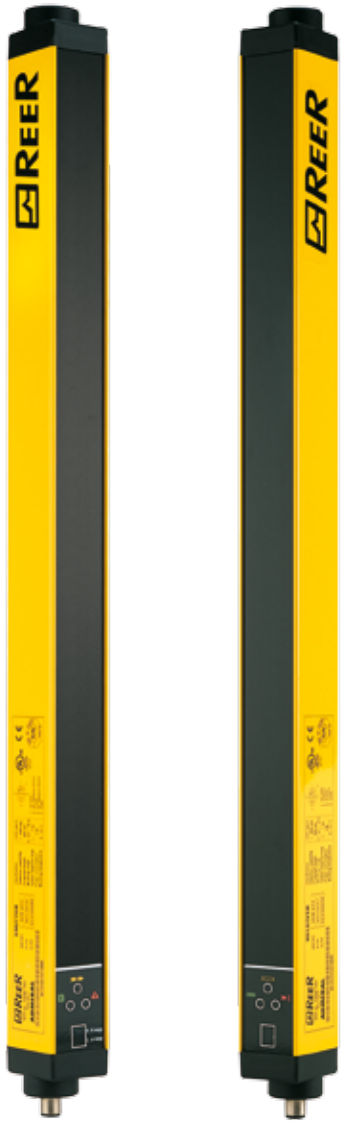
ADMIRAL AD

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
All connections and configurations by means of M12 connectors.
Use of standard 5-pole cables.
Suppression of optical interference by means of range selection.
Start/Restart interlock and EDM via external ADSR1 interface.

TECHNICAL FEATURES

Safety	Type 4
Protected heights mm	160 ÷ 1810
Resolutions mm	14 - 20 - 30 - 40 - 50 - 90
Number of beams for body detection in access control	2 - 3 - 4
Max range m	selectable 2 - 5 for 14 mm resolution selectable 6 – 18 for 20 – 30 – 40 – 50 – 90 mm resolutions and 2 – 3 - 4 beams
Response time ms	6 ÷ 27
Safety outputs	2 PNP - 500 mA at 24 Vdc
Signalling	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Restart	automatic
Power supply Vdc	24 ± 20%
Electrical connections	M12 - 5 poles for emitter and receiver
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45



Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electro sensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

ADMIRAL AD

Resolution 14 mm	AD 151	AD 301	AD 451	AD 601	AD 751	AD 901	AD 1051	AD 1201	AD 1351	AD 1501	AD 1651	AD 1801
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 20 mm	AD 152	AD 302	AD 452	AD 602	AD 752	AD 902	AD 1052	AD 1202	AD 1352	AD 1502	AD 1652	AD 1802
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 30 mm	AD 153	AD 303	AD 453	AD 603	AD 753	AD 903	AD 1053	AD 1203	AD 1353	AD 1503	AD 1653	AD 1803
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 40 mm	AD 304	AD 454	AD 604	AD 754	AD 904	AD 1054	AD 1204	AD 1354	AD 1504	AD 1654	AD 1804
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 50 mm	AD 305	AD 455	AD 605	AD 755	AD 905	AD 1055	AD 1205	AD 1355	AD 1505	AD 1655	AD 1805
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	12	16	20	24	28	32	36	40	44	48
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 90 mm	AD 309	AD 459	AD 609	AD 759	AD 909	AD 1059	AD 1209	AD 1359	AD 1509	AD 1659	AD 1809
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	5	7	9	11	13	15	17	19	21	23	25
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

2-3-4 beams	AD 2B	AD 3B	AD 4B
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111

• For accessories list see page 46
• For ordering codes see page 129

ADMIRAL AX

WITH BUILT-IN CONTROL FUNCTIONS

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
Built-in start/restart interlock, selectable.
Feedback input for external device monitoring (EDM).
All connections and configurations by means of M12 connectors.
Use of standard 5-pole and 8-pole cables.
Suppression of optical interference by means of range selection.
Master and Slave models for serial connection of 2 light curtains.
Maximum length of the connections between Master and Slave: 50 metres, with standard cable.

TECHNICAL FEATURES

Safety	Type 4
Protected heights mm	160 ÷ 1810
Resolutions mm	14 - 20 - 30 - 40 - 50 - 90
Number of beams for body detection in access control	2 - 3 - 4
Max range m	selectable 2 - 5 for 14 mm resolution selectable 6 – 18 for 20 – 30 – 40 – 50 – 90 mm resolutions and 2 – 3 - 4 beams
Response time ms	6 ÷ 27
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	seven-segment display and LEDs for light curtain's status and diagnostic
Restart	selectable automatic or manual
External Device Monitoring	external device monitoring feedback input with enabling, selectable
Power supply Vdc	24 ± 20%
Electrical connections per AX e AX Master	M12 - 5 poles for emitter poles for receiver
Electrical connections tra Master e Slave	M12 - 5 poles for emitter and receiver
Max. cable length m	100 (50 between master and slave)
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45

Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

ADMIRAL AX

WITH BUILT-IN CONTROL FUNCTIONS

Resolution 14 mm	AX 151	AX 301	AX 451	AX 601	AX 751	AX 901	AX 1051	AX 1201	AX 1351	AX 1501	AX 1651	AX 1801
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 20 mm	AX 152	AX 302	AX 452	AX 602	AX 752	AX 902	AX 1052	AX 1202	AX 1352	AX 1502	AX 1652	AX 1802
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 30 mm	AX 153	AX 303	AX 453	AX 603	AX 753	AX 903	AX 1053	AX 1203	AX 1353	AX 1503	AX 1653	AX 1803
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 40 mm	AX 304	AX 454	AX 604	AX 754	AX 904	AX 1054	AX 1204	AX 1354	AX 1504	AX 1654	AX 1804
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 50 mm	AX 305	AX 455	AX 605	AX 755	AX 905	AX 1055	AX 1205	AX 1355	AX 1505	AX 1655	AX 1805
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	12	16	20	24	28	32	36	40	44	48
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 90 mm	AX 309	AX 459	AX 609	AX 759	AX 909	AX 1059	AX 1209	AX 1359	AX 1509	AX 1659	AX 1809
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	5	7	9	11	13	15	17	19	21	23	25
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

2-3-4 beams	AX 2B	AX 3B	AX 4B
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111

• For accessories list see page 46
• For ordering codes see page 129

ADMIRAL AX

WITH BUILT-IN CONTROL FUNCTIONS

MASTER / SLAVE MODELS

MASTER Resolution 14 mm		AX 301M	AX 451M	AX 601M	AX 751M	AX 901M	AX 1051M	AX 1201M	AX 1501M
SLAVE Resolution 14 mm	AX 151S	AX 301S	AX 451S	AX 601S	AX 751S	AX 901S	AX 1051S	AX 1201S	AX 1501S
Protected heights mm	160	310	460	610	760	910	1060	1210	1510
Number of beams	15	30	45	60	75	90	105	120	150
Overall height mm *	261	411	561	711	861	1011	1161	1311	1611

MASTER Resolution 20 mm		AX 302M	AX 452M	AX 602M	AX 752M	AX 902M	AX 1052M	AX 1202M	AX 1502M
SLAVE Resolution 20 mm	AX 152S	AX 302S	AX 452S	AX 602S	AX 752S	AX 902S	AX 1052S	AX 1202S	AX 1502S
Protected heights mm	160	310	460	610	760	910	1060	1210	1510
Number of beams	15	30	45	60	75	90	105	120	150
Overall height mm *	261	411	561	711	861	1011	1161	1311	1611

MASTER Resolution 30 mm		AX 303M	AX 453M	AX 603M	AX 753M	AX 903M	AX 1053M	AX 1203M	AX 1503M
SLAVE Resolution 30 mm	AX 153S	AX 303S	AX 453S	AX 603S	AX 753S	AX 903S	AX 1053S	AX 1203S	AX 1503S
Protected heights mm	160	310	460	610	760	910	1060	1210	1510
Number of beams	8	16	24	32	40	48	56	64	80
Overall height mm *	261	411	561	711	861	1011	1161	1311	1611

MASTER Resolution 50 mm		AX 305M	AX 455M	AX 605M	AX 755M	AX 905M	AX 1055M	AX 1205M	AX 1505M
SLAVE Resolution 50 mm		AX 305S	AX 455S	AX 605S	AX 755S	AX 905S	AX 1055S	AX 1205S	AX 1505S
Protected heights mm		310	460	610	760	910	1060	1210	1510
Number of beams		8	12	16	20	24	28	32	40
Overall height mm *		411	561	711	861	1011	1161	1311	1611

MASTER 2-3 beams								AX 2BM	AX 3BM
SLAVE 2-3 beams								AX 2BS	AX 3BS
Number of beams								2	3
Distance between beams mm (mm)								500	400
Protected heights mm								510	810
Overall height mm *								711	1011

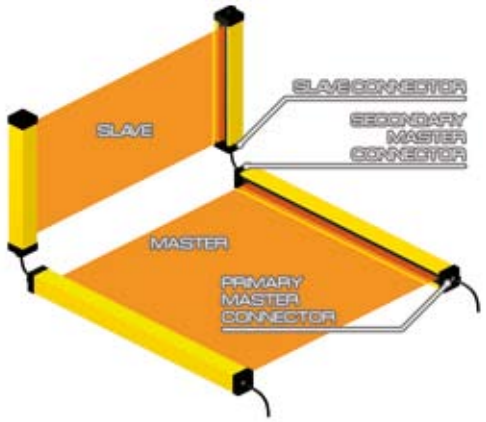
* In the Master models the total light curtain height is increased by 10 mm due to the presence of the secondary connector.

• For accessories list see page 45
• For ordering codes see page 129

ADMIRAL AX

WITH BUILT-IN CONTROL FUNCTIONS

MASTER / SLAVE MODELS

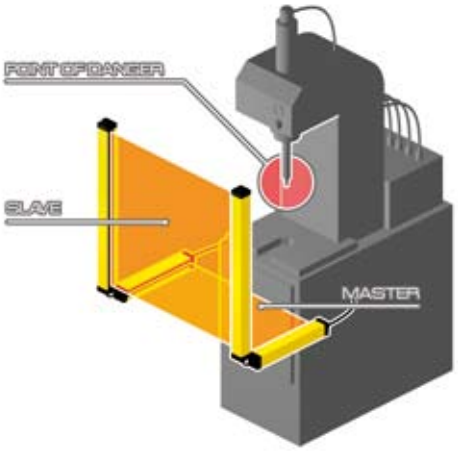


Example of serial connection between a Master light curtain and a Slave light curtain

It is possible to combine any Master model with any Slave model.

All the electrical connections are made using 5-pole M12 connectors, except for the Master receiver, which requires an 8-pole M12 connector.

Accessory cables pre-wired with 2 connectors are available for the connection between Master and Slave.

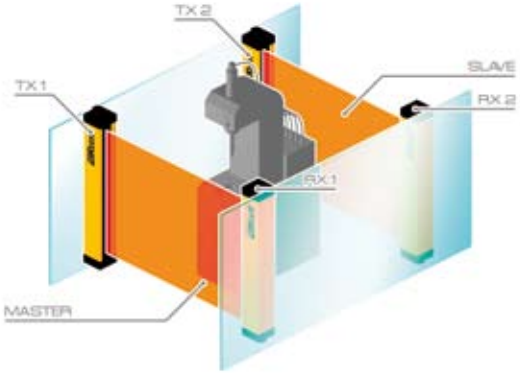


Example of serial connection between a Master light curtain and a Slave light curtain

The Master light curtain is positioned horizontally for detecting the presence of the person while the vertical Slave light curtain detects fingers or hands.

However, it is possible to invert the combination and have the Master light curtain positioned vertically for protection of fingers or hands and the Slave light curtain horizontally for detecting the presence of the person.

The application illustrated is one of the most common: the horizontal light curtain is used for eliminating the possibility for the operator not to be detected between the vertical light curtain and the dangerous machine at the start or restart of the system.



Example of serial connection between a Master light curtain and a Slave light curtain for protection of 2 sides of the machine

In the Admiral AX light curtains the connection cable between Master and Slave is a standard cable that can be up to 50 metres long.

This characteristic allows the application of 2 light curtains in series positioned on the front and on the back of the dangerous machine, with a single connection towards the power and control circuits of the machine.

ADMIRAL AX BK

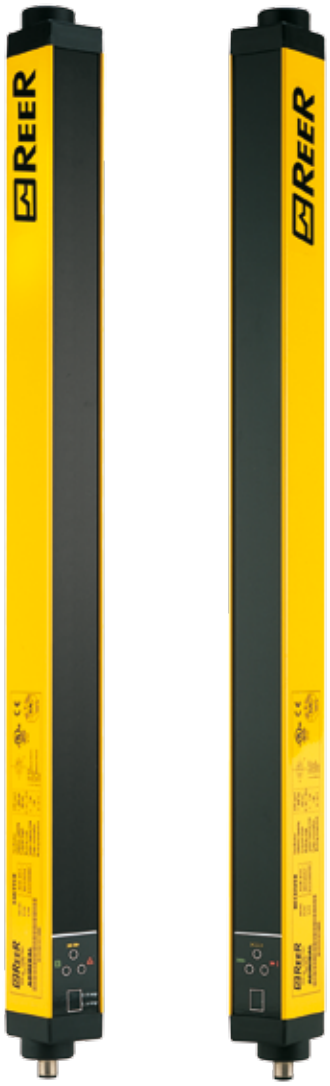
WITH BLANKING FUNCTION

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
Built-in floating blanking function with 5 configuration modes.
All connections and configurations by means of M12 connectors.
Use of standard 5-pole and 8-pole cables.
Suppression of optical interference by means of range selection.
Master and Slave models for serial connection of 2 light curtains.
Maximum length of the connections between Master and Slave: 50 metres, with standard cable.
Start/Restart interlock and EDM via external ADSR1 interface.

TECHNICAL FEATURES

Safety	Type 4
Protected heights mm	160 ÷ 1810
Resolutions mm	14 - 20 - 40 - 90
Max range m	selectable 2 - 5 for 14 mm resolution selectable 6 – 18 for 20 – 40 – 90 mm resolutions
Response time ms	6 ÷ 27
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	seven-segment display and LEDs for light curtain's status and diagnostic
Restart	automatic
Blanking	floating, selectable
Blanking configurations	5 modes: 1, 2 or 3 beams without compulsory object presence 1 or 2 beams with compulsory object presence
Power supply Vdc	24 ± 20%
Electrical connections per AX e AX Master	M12 - 5 poles for emitter M12 - 8 poles for receiver
Electrical connections tra Master e Slave	M12 - 5 poles for emitter and receiver
Max. cable length m	100 (50 between master and slave)
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45



Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

ADMIRAL AX BK

WITH BLANKING FUNCTION

Resolution 14 mm	AX 151 BK	AX 301 BK	AX 451 BK	AX 601 BK	AX 751 BK	AX 901 BK	AX 1051 BK	AX 1201 BK	AX 1351 BK	AX 1501 BK	AX 1651 BK	AX 1801 BK
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 20 mm	AX 152 BK	AX 302 BK	AX 452 BK	AX 602 BK	AX 752 BK	AX 902 BK	AX 1052 BK	AX 1202 BK	AX 1352 BK	AX 1502 BK	AX 1652 BK	AX 1802 BK
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 40 mm	AX 304 BK	AX 454 BK	AX 604 BK	AX 754 BK	AX 904 BK	AX 1054 BK	AX 1204 BK	AX 1354 BK	AX 1504 BK	AX 1654 BK	AX 1804 BK
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 90 mm	AX 609 BK	AX 759 BK	AX 909 BK	AX 1059 BK	AX 1209 BK	AX 1359 BK	AX 1509 BK	AX 1659 BK	AX 1809 BK
Protected heights mm	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	9	11	13	15	17	19	21	23	25
Overall height mm	711	861	1011	1161	1311	1461	1611	1761	1911

MASTER MODELS WITH BLANKING

Resolution 14 mm	AX 301 BKM	AX 451 BKM	AX 601 BKM	AX 751 BKM	AX 901 BKM	AX 1051 BKM	AX 1201 BKM	AX 1501 BKM
Protected heights mm	310	460	610	760	910	1060	1210	1510
Number of beams	30	45	60	75	90	105	120	150
Overall height mm	421	571	721	871	1021	1171	1321	1671

Resolution 20 mm	AX 302 BKM	AX 452 BKM	AX 602 BKM	AX 752 BKM	AX 902 BKM	AX 1052 BKM	AX 1202 BKM	AX 1502 BKM
Protected heights mm	310	460	610	760	910	1060	1210	1510
Number of beams	30	45	60	75	90	105	120	150
Overall height mm	421	571	721	871	1021	1171	1321	1671

- The Master with Blanking models are combined with the Slave models of the Admiral series AX.
- The blanking function is only present on the Master models with resolution 14 and 20 mm.

• For accessories list see page 46
• For ordering codes see page 130

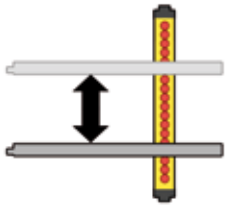
ADMIRAL AX BK

WITH BLANKING FUNCTION

THE BLANKING FUNCTION

Information on the blanking function can be found on page 24 in the Safety Guide section

The Floating Blanking function is available on the Admiral AX BK models. Floating Blanking allows the detected object to move freely inside the light curtain's protected field, under the condition that the intercepted beams are adjacent and that their number is not higher than the configured one.



CONFIGURATION MODES OF THE BLANKING FUNCTION IN THE ADMIRAL AX BK MODELS:

Mode	Type of blanking configuration	N° of beams in blanking	Detection characteristics
A1	1 beam without compulsory object presence	1	1 beam can be obstructed with the light curtain remaining in an ON condition
A2	2 beams without compulsory object presence	2	1 or 2 adjacent beams can be obstructed with the light curtain remaining in an ON condition
A3	3 beams without compulsory object presence	3	1, 2 or 3 adjacent beams can be obstructed with the light curtain remaining in an ON condition
B1	2 beams with compulsory object presence	1/2	at least 1 beam and no more than 2 adjacent beams must be obstructed for the light curtain to remaining in an ON condition
B2	3 beams with compulsory object presence	1/2/3	at least 1 beam and no more than 3 adjacent beams must be obstructed for the light curtain to remaining in an ON condition

WARNING !

The AX BK light curtains with blanking function do not have the feedback input (EDM); therefore, they cannot be combined with the AD SR0 and AD SR0A relay modules but they should be connected with the ADSR1 or ADSRM safety interfaces.
The use of the blanking function and the type of configuration selected depend on the characteristics of the application to be protected. You need to verify, based on the risk analysis of your application, whether the use of this function is permitted or not and what configuration it is possible to use. Reer SpA does not assume responsibility for the improper use of the blanking function and for any consequent damage.

The use of the blanking function may need a recalculation of the safety distance due to the modified detection capability

ADMIRAL AX WT

WITH IP 67 WATERTIGHT HOUSING

MAIN FEATURES

The **WT watertight housing** enables the use of Admiral light curtains in harsh working environments characterised by the presence of water, steam, and low temperatures.
This solution is ideal for applications in the food processing industry and in washing systems, including those under pressure.
Models are available for protecting light curtains with protected height from 160 to 1810 mm.

TECHNICAL FEATURES

All the main technical features are the same of ADMIRAL AX

Protection rating	IP 67
Operating temperature °C	0 ÷ 55
Max water pressure (jets)	40 bar (with temperature from 10° to 40°)
Max range m	5 – 15 selectable
Available Resolution mm	30
Number of beams for body detection in access control	2 – 3 - 4
Light curtain electrical connections	cable 10 metres pre-wired with cable gland
Fastening	by means of set of 4 WFB ring brackets (included)
Dimensions mm	Total light curtain height + 124 x 75 Ø

MODELS

Resolution 30 mm	AX 153 WT	AX 303 WT	AX 453 WT	AX 603 WT	AX 753 WT	AX 903 WT	AX 1053 WT	AX 1203 WT	AX 1353 WT	AX 1503 WT	AX 1653 WT	AX 1803 WT
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	375	525	675	825	975	1125	1275	1425	1575	1725	1875	2025

2-3-4 beams	AX 2B WT	AX 3B WT	AX 4B WT
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	825	1125	1225

- The light curtains are supplied already housed in the WT watertight housings.
- Cables and ring brackets are included in the kit.

Please contact Reer preventively to assess adequacy to your application.

ADMIRAL

ORDERING INFORMATION (for ordering codes see page 129)

Each Admiral light curtain comprises:

- Emitter and Receiver pair
- Mounting brackets and T-nuts
- CD-ROM containing the multi-language instruction manual complete with CE declaration of conformity

ACCESSORIES

For Admiral light curtains the following accessories, to be ordered separately, are available:

• AD SR Safety Relays	see page 105
• LAD laser alignment device	see page 124
• FMC floor mounting columns	see page 120
• SP deflection mirrors	see page 122
• SFB swivel fixing brackets	see page 125
• SAV vibrations dampers	see page 125
• Connectors	see below:

CONNECTORS FOR ADMIRAL (AD emitter and receiver / AX - AX BK emitter)

Model	Description
CD 5	M12, straight connector, 5 poles, pre-wired cable 5 m
CD 10	M12, straight connector, 5 poles, pre-wired cable 10 m
CD 15	M12, straight connector, 5 poles, pre-wired cable 15 m
CD 20	M12, straight connector, 5 poles, pre-wired cable 20 m
CD 95	M12, 90° angle connector, 5 poles, pre-wired cable 5 m
CD 910	M12, 90° angle connector, 5 poles, pre-wired cable 10 m
CD 915	M12, 90° angle connector, 5 poles, pre-wired cable 15 m
CDM 9	M12, straight connector, 5 poles with screw terminal, PG9 cable gland
CDM 99	M12, angle connector, 5 poles with screw terminal, PG9 cable gland

CONNECTORS FOR ADMIRAL AX and AX BK receiver

Model	Description
C8D 5	M12, straight connector, 8 poles, pre-wired cable 5 m
C8D 10	M12, straight connector, 8 poles, pre-wired cable 10 m
C8D 15	M12, straight connector, 8 poles, pre-wired cable 15 m
C8D 95	M12, 90° angle connector, 8 poles, pre-wired cable 5 m
C8D 910	M12, 90° angle connector, 8 poles, pre-wired cable 10 m
C8D 915	M12, 90° angle connector, 8 poles, pre-wired cable 15 m
C8DM 9	M12, straight connector, 8 poles with screw terminal, PG9 cable gland
C8DM 99	M12, angle connector, 8 poles with screw terminal, PG9 cable gland
C8DM 11 | **new**	M12, straight connector, 8 poles with screw terminal, PG9/11 cable gland
C8DM 911 | **new**	M12, angle connector, 8 poles with screw terminal, PG9/11 cable gland

CONNECTION BETWEEN MASTER AND SLAVE

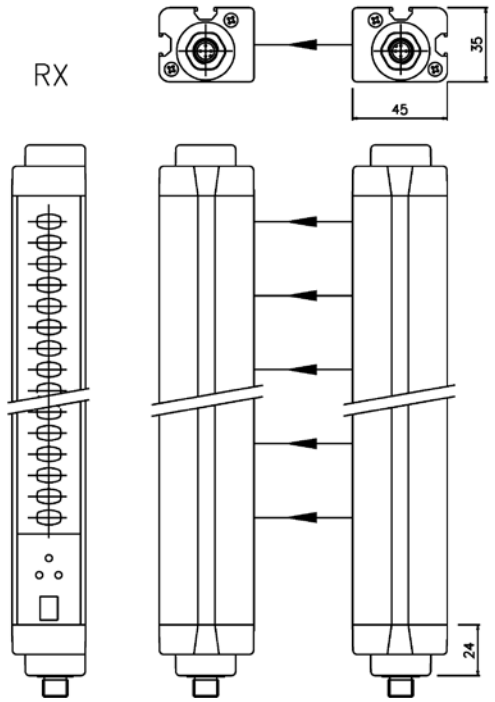
Model	Description
CDS 03	0.3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 3	3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 5	5 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 10	10 m pre-wired cable with 2 straight connectors, M12, 5 poles

The Admiral AX WT models are already supplied with 10 metres pre-wired cables and ring brackets

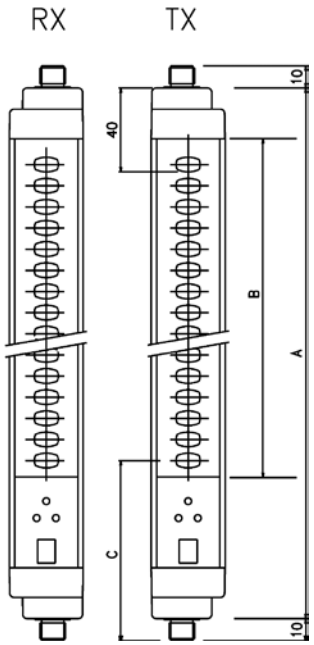
ADMIRAL

DIMENSIONS (mm)

STANDARD AND SLAVE MODELS



MASTER MODELS



Model	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800
A	251	401	551	701	851	1001	1151	1301	1451	1601	1751	1901
B (protected height)	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
C (1st beam position)	85											
Mounting	2 LS type brackets with 2 inserts							3 LS type brackets with 3 inserts				

Model	2B	3B	4B
A	701	1001	1101
B	510	810	910
C (1st beam position)	135		
Mounting	2 LS type brackets with 2 inserts		

WARNING !

- When the light curtain works in the presence of strong vibrations (presses, weaving machines etc.), in order to avoid damages to the light curtain it is necessary to use the vibration dampers SAV (available as accessories).
- When long range protections or perimeter protections employing mirrors have to be realised it is advisable to use the LAD laser pointer as an alignment aid, as well as the adjustable swivel brackets SWB.

JANUS

http://muting.reer.it

JANUS

The **Janus** type 4 family of safety light curtains is the ideal solution for the protection of a vast number of high-risk industrial applications, in particular those requiring a high level of integration of the safety functions.

For example, in the models with **built-in Muting** function, Janus guarantees the independence of the light curtain from the control circuits of the system (often distant from the protected gate) and, where necessary, also the integration of the muting **sensors**.

The features of the Janus range include:

- Settings of each function integrally performed via the main connector.
- Integration of the main safety functions, including self-testing of the solid state outputs, external device monitoring (EDM) and the Start / Restart interlock function.
- Integration of the muting function for the MI models and of the muting sensors for the ML and MT models.
- The utmost reliability in the field, thanks to the rugged construction and to the high level of immunity to external interference (optical, EMC, etc.).
- Long Range (LR) versions with 60 m range and TRX versions with passive retro-reflector element are available for many models of the Janus range.

THE JANUS RANGE:

JANUS M

Janus M is a range of light curtains designed specifically for the protection of dangerous systems where the muting function is necessary.
The range includes:
- the MI series, with connectors for connecting external sensors of any type.
- the ML series and the MT series, which feature an innovative system of horizontal arms with built-in photoelectric muting sensors, pre-wired and pre-aligned, adjustable in height in order to be able to calibrate the optical plane and the intensity of the signal of the sensors and thereby obtain a reliable and constant detection of the material in transit.

The ML and MT models, including a wide variety of models and special versions, make it possible to resolve any problem of muting detection for all **palletiser** applications.

JANUS TRX | New

The TRX versions are available both for J and MI /ML /MT models, only for the 2-3-4 beams models for access control. They are composed of an active element comprising emitter and receiver, and a passive, retro-reflector element which needs no power supply nor any other wiring.

JANUS J

Janus J is a range of light curtains without the muting function, but which has the same dimensional and electrical characteristics of the M versions with muting.
It includes:
- the J series with 2, 3, 4 beams useful as a complement to the M versions;

and

JANUS LR

The LR (Long Range) versions are available for J and MI models. Their operating range is up to 60 m and they are available in the 2-3-4 beams models for access control or with 40 mm resolution.

Special models conforming to the "**ATEX Directive**" 94/9/EEC - Dust Zone 22 - Gas Zone 2, for applications in potentially explosive atmospheres or at risk of fire, are available on request, along with versions with watertight housing for applications, for example, in the food processing industry.

Dedicated accessories are also available for the JANUS light curtains, such as pre-wired cables and **MJB connection boxes**, complete with restart and override controls as well as the muting lamp and built-in relays that permit a simple, fast, and reliable interface between the light curtains and the machine.

JANUS M

WITH MUTING FUNCTION

JANUS M

MI SERIES

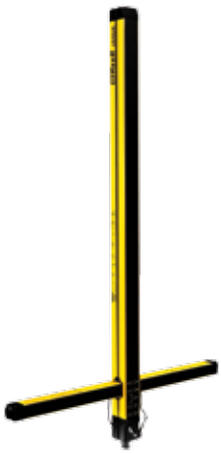
The **MI** series features dedicated connections for connecting external **muting** sensors of any type such as photocells, proximity sensors, limit switches, etc.; it can manage the muting function in both **two-way** and **one-way** mode.

A wide range of models with protected height from 310 mm to 1810 mm with resolution of 30, 40, 90 mm and models with 2, 3, 4 beams provides the solution to any application problem.

ML SERIES

The **ML** series, with 2 or 3 beams for detecting the presence of a person, uses an original system of **horizontal arms** (one for the emitter and one for the receiver) with **built-in pre-wired and pre-aligned photoelectric muting sensors** which do not require any adjustment.
The **arms** can be **adjusted in height** in order to create a detection plane that is more or less angled, with the purpose to achieve correct and constant detection of the material in transit and therefore reliable operation of the protection system.
This ensures the maximum speed and simplicity of installation.
The ML series manages the **muting** function in **one-way mode** and is particularly suitable for protecting the outfeed gates of palletising systems.

The ML series also includes ML_S2 special models for the correct detection of transparent objects.



MT SERIES

The **MT** series features **four horizontal arms** (two for the emitter and two for the receiver) with built-in **pre-wired and pre-aligned photoelectric muting sensors** that do not require any adjustment.
The **arms** can be **adjusted in height** in order to create a detection plane that is more or less angled, with the purpose to achieve correct and constant detection of the material in transit and therefore reliable operation of the protection system.
This ensures the maximum speed and simplicity of installation. The MT series manages the **muting** function in **two-way mode** for the protection of the infeed/outfeed gates in palletising systems.

The MT series also includes MT_S4 special models for the correct detection of transparent objects.

With the ML and MT models, system installation is fast and simple; moreover, compliance with the regulatory requirements regarding the geometry of the muting sensors and all the other safety parameters is guaranteed.

JANUS M TRX | New

WITH PASSIVE RETRO-REFLECTOR ELEMENTS

JANUS M TRX

MI TRX SERIES

The **MI TRX** series is composed of an active element and of a passive retro-reflector element requiring no wiring.
It features dedicated connections for connecting external muting sensors of any type such as photocells, proximity sensors, limit switches, etc.
The MI series can manage the **muting** function in both **two-way** and **one-way mode**.

Models with 2 or 3 beams provide the solution to any application problem in access control.

ML TRX SERIES

The **ML TRX** series, with 2 or 3 beams for detecting the presence of a person, uses an original system of **horizontal arms** (one for the emitter and one for the receiver) with **built-in, pre-wired and pre-aligned, photoelectric muting sensors** which do not require any adjustment.
Both the light grid and the sensor arms are composed of an **active**, emitter/receiver element and of a **passive**, retro-reflector element, requiring no wiring.
The sensor **arms** can be **adjusted in height** in order to create a detection plane that is more or less angled, with the purpose to achieve correct and constant detection of the material in transit and therefore reliable operation of the protection system.
This ensures the maximum speed and simplicity of installation.

The ML TRX series manages the muting function in one-way mode and is particularly suitable for protecting the outfeed gates of palletising systems.

MT TRX SERIES

The **MT TR**X series features **four horizontal arms** (two for the emitter and two for the receiver) with built-in **pre-wired and pre-aligned photoelectric muting sensors** that do not require any adjustment.
Both the light grid and the sensor arms are composed of an **active**, emitter/receiver element and of a **passive**, retro-reflector element, requiring no wiring.
The **arms** can be **adjusted in height** in order to create a detection plane that is more or less angled, with the purpose to achieve correct and constant detection of the material in transit and therefore reliable operation of the protection system.
This ensures the maximum speed and simplicity of installation.
The MT TRX series manages the **muting** function in **two-way mode** for the protection of the infeed/outfeed gates in palletising systems.

With the ML TRX and MT TRX models, system installation is fast and simple; moreover, compliance with the regulatory requirements regarding the geometry of the muting sensors and all the other safety parameters is guaranteed.

JANUS M

WITH MUTING FUNCTION

MAIN FEATURES

Built-in muting function in all the models. Ideal for palletiser applications.

MI models with front M12 connectors for external muting sensors, with operating logic with 2 or 4 sensors.

Two and four beam models with **passive retroreflector element**, **MI TRX** with front M12 connectors for external muting sensors and operating logic with 2 or 4 sensors, and **MI TRXL** with single M23 connector and operating logic with 2 sensors.

Patented **ML** and **MT** models with muting sensors built into pre-wired and pre-aligned arms, adjustable in height and angle.

Patented **ML TRX** and **MT TRX** models with **passive retroreflector elements** and reflex muting sensors built into pre-wired and pre-aligned arms, adjustable in height and angle.

ML: pallet outfeed only. MT: infeed and outfeed.

Broad flexibility of configuration for the **muting timeouts**; two types of **override** selectable. Configuration is carried out via hardware by means of the main connector. Standard cables up to 100 m long are used.

MI Long Range models available with range up to 60 m.

MJB Connection Box for quick connection of the light curtains and providing the main commands necessary for their operation close to the protected gate.

Special models in compliance with the **"ATEX Directive"** 94/9/CEE – Dust Zone 22. - Gas Zone 2 available on request.

JANUS MT

Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

JANUS M

WITH MUTING FUNCTION

GENERAL TECHNICAL DATA

Safety	Type 4
Response time ms	7 ÷ 30
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Light curtain status indication and weak signal output	PNP – 100 mA at 24 Vdc
Muting status indication output	PNP – 100 mA at 24 Vdc (only M TRX models)
Muting Enable input	Active High - 24 Vdc (only M TRX models)
Light signals	7-segment display and LEDs for self-diagnosis and light curtain status
Restart	Automatic or manual restart selectable
External Device Monitoring	External device monitoring feedback input with enabling, selectable
Max. muting timeout	30 sec.,90 min. or infinite selectable (depending on the models)
Override function	Built-in override function with 2 operating modes, selectable: - manual action with hold to run - automatic with pulse command
Max Override Time-out min	15
Muting lamp output	24 Vdc 0,5 ÷ 5W
Power supply Vdc	24 ± 20%
Electrical connections MI-ML-MT models	Emitter M12 5-pole – receiver: M23 19-pole - muting sensors: M12 5-pole
Electrical connections MI TRX-ML TRX-MT TRX models	Active element: M23 19-pole - muting sensors: M12 5-pole
Electrical connections MI TRXL	Active element: M23 19-pole
Max. length electrical connections m	100
Operating temperature °C	0 ÷ 55
Fastening modes	back or side slot
Protection rating	IP 65
Cross-section dimensions mm	50 x 60

JANUS M

WITH MUTING FUNCTION

MI SERIES	
Protected heights mm	310 ÷ 1810 for light curtains with 40 and 90 mm resolution 310 ÷ 1210 for light curtains with 30 mm resolution
Resolutions available mm	30 – 40 - 90
Number of beams for access control	2 – 3 – 4
Max range m	selectable 6 – 16
Max range for Long Range models m	selectable 30 – 60
Muting logic	two-way with 2 or 4 sensors one-way with 2 sensors
Muting Sensors	External muting sensors with relay or PNP output (dark-on logic)
MI TRX SERIES	
Number of beams for access control	2 – 3 with passive retro-reflector element
Max range m	6
Muting logic	two-way with 2 or 4 sensors (2 sensors only for MI TRXL) one-way with 2 sensors
Muting Sensors	External muting sensors with relay or PNP output (dark-on logic)
ML SERIES	
Number of beams for access control	2 – 3
Operating range m	1 ÷ 2,5 (0 ÷ 2 for ML_S2)
Muting logic	one-way with 2 sensors
Muting Sensors	optoelectronic with 2 crossed or parallel beams built-in – pre-aligned – pre-wired, with adjustable height and angle
ML TRX SERIES	
Number of beams for access control	2 – 3 with passive retro-reflector element
Operating range m	0 ÷ 3,5
Muting logic	one-way with 2 sensors
Muting Sensors	Reflex optoelectronic with 2 parallel beams built-in – pre-aligned – pre-wired, with adjustable height and angle
MT SERIES	
Number of beams for access control	2 – 3
Operating range m	1 ÷ 2,5 (0 ÷ 2 for MT_S4)
Muting logic	two-way with 2 sensors (models MT) two-way sequential with 4 sensors (models MT_S4)
Muting Sensors	optoelectronic with 2 crossed or 4 parallel beams built-in – pre-aligned – pre-wired, with adjustable height and angle
MT TRX SERIES	
Number of beams for access control	2 – 3 with passive retro-reflector element
Operating range m	0 ÷ 3,5
Muting logic	two-way sequential with 4 sensors
Muting Sensors	Reflex optoelectronic with 4 parallel beams built-in – pre-aligned – pre-wired, with adjustable height and angle

JANUS M

WITH MUTING FUNCTION

MI and MI LR 2 – 3 – 4 beams	MI 2B	MI 3B	MI 4B	MI 2B LR	MI 3B LR	MI 4B LR
Number of beams	2	3	4	2	3	4
Distance between beams mm	500	400	300	500	400	300
Protected heights mm	510	810	910	510	810	910
Overall height mm	776	1076	1176	776	1076	1176
Max. range m	selectable 6-16			selectable 30-60		

MI TRX and MI TRXL 2-3 beams with passive retroreflective element	MI 2B TRX	MI 3B TRX	MI 2B TRXL	MI 3B TRXL
Number of beams	2	3	2	3
Distance between beams mm	500	400	500	400
Protected heights mm	510	810	510	810
Overall height mm	776	1076	741	1041
Max. range m	6			

ML 2 – 3 beams	ML 2B	ML 3B	ML 2B S2	ML 3B S2
Number of beams	2	3	2	3
Distance between beams mm	500	400	500	400
Protected heights mm	510	810	510	810
Overall height mm	776	1076	776	1076
Muting Sensors	2 crossed		2 parallel	
Operating range m	1 ÷ 2,5		0 ÷ 2	

MT 2 – 3 beams	MT 2B	MT 3B	MT 2B S4	MT 3B S4
Number of beams	2	3	2	3
Distance between beams mm	500	400	500	400
Protected heights mm	510	810	510	810
Overall height mm	776	1076	776	1076
Muting Sensors	2 crossed		4 parallel	
Operating range m	1 ÷ 2,5		0 ÷ 2	

ML TRX 2 – 3 beams with passive retroreflective elements	ML 2B TRX	ML 3B TRX
Number of beams	2	3
Distance between beams mm	500	400
Protected heights mm	510	810
Overall height mm	776	1076
Reflex Muting Sensors	2 parallel	
Operating range m	0 ÷ 3,5	

MT TRX 2 – 3 beams with passive retroreflective elements	MT 2B TRX	MT 3B TRX
Number of beams	2	3
Distance between beams mm	500	400
Protected heights mm	510	810
Overall height mm	776	1076
Reflex Muting Sensors	4 parallel	
Operating range m	0 ÷ 3,5	

JANUS M

WITH MUTING FUNCTION

MI Resolution 30 mm	MI 303	MI 453	MI 603	MI 753	MI 903	MI 1053	MI 1203
Protected heights mm	310	460	610	760	910	1060	1210
Number of beams	16	24	32	40	48	56	64
Overall height mm	476	626	776	926	1076	1226	1376
Max range m	selectable 6 – 16						

MI Resolution 40 mm	MI 304	MI 454	MI 604	MI 754	MI 904	MI 1054	MI 1204	MI 1354	MI 1504	MI 1654	MI 1804
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	476	626	776	926	1076	1226	1376	1526	1676	1826	1976
Max range m	selectable 6 – 16										

MI Long Range Resolution 40 mm	MI 604 LR	MI 904 LR	MI 1204 LR
Protected heights mm	610	910	1210
Number of beams	30	45	60
Overall height mm	776	1076	1376
Max range m	selectable 30 – 60		

Models MI Resolution 90 mm	MI 309	MI 459	MI 609	MI 759	MI 909	MI 1059	MI 1209	MI 1359	MI 1509	MI 1659	MI 1809
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	5	7	9	11	13	15	17	19	21	23	25
Overall height mm	476	626	776	926	1076	1226	1376	1526	1676	1826	1976
Max range m	selectable 6 – 16										

• For accessories list see page 69
• For ordering codes see page 130

JANUS M

WITH MUTING FUNCTION

MI – MI TRX – MI TRXL

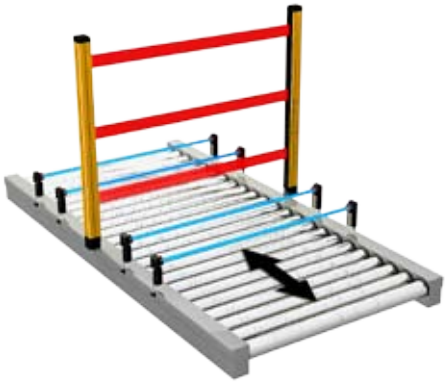
Two-way muting with 2 sensors

- Two-way muting.
- Max. time between the 2 muting activation signals: 4 sec.
- Possibility of use with photocells, proximity sensors, and limit switches.
- Max. muting timeout time 30 sec. or 90 min. selectable.
- Configuration usable with light curtains with resolution 30, 40, 90 mm with protected height from 310 to 1810 mm, with light grids with 2, 3, 4 beams and light grids with 2 or 3 beams with passive retroreflector element.
- Muting enable input available (only for MI TRX models)

Characteristics

- Suitable for the most common pallet infeed/outfeed applications.
- Muting enable input allows to start a muting sequence only when needed by the machine cycle (MI TRX and MI TRXL models only)

MI – MI TRX



Two-way sequential muting with 4 sensors

- Two-way muting sequence.
- Max. time between the muting activation signals: 4 sec. or infinite, selectable.
- Possibility to use with photocells, proximity sensors, and limit switches.
- Max. muting timeout time 30 sec. or infinite, selectable.
- Configuration usable with light curtains with resolution 30, 40, 90 mm with protected height from 310 a 1810 mm, with light grids with 2, 3, 4 beams and light grids with 2 or 3 beams with passive retroreflector element
- Muting enable input available (only for MI TRX models)

Characteristics

- Correct muting sequence even in the presence of pallets with reduced width and/or length or not centred with respect to the conveyor.
- Possibility of two-way transit of the pallets and simultaneous protection in the two directions against unauthorised access of personnel.
- Muting enable input allows to start a muting sequence only when needed by the machine cycle (MI TRX and MI TRXL models only).

MI – MI TRX – MI TRXL

One-way muting with 2 sensors

- One-way muting for pallet outfeed only.
- Max. time between the 2 muting activation signals: 4 sec.
- Possibility to use with photocells, proximity sensors, and limit switches.
- Max. muting timeout time: 30 sec. or 90 min. selectable.
- Configuration usable with light curtains with resolution 30, 40, 90 mm with protected height from 310 a 1810 mm, with light grids with 2, 3, 4 beams and light grids with 2 or 3 beams with passive retroreflector element.
- Muting enable input available (only for MI TRX models)

Characteristics

- The light curtain only enables the pallet outfeed.
- The muting function can only be activated from inside the protected zone. No possibility to activate a muting sequence from the outside.
- Elimination of bulk outside the protected area, as the muting sensors are only present inside the area.
- Correct muting sequence even in the presence of a pallet with reduced width and/or length or not centred with respect to the conveyor.
- Muting enable input allows to start a muting sequence only when needed by the machine cycle (MI TRX and MI TRXL models only).

JANUS M

WITH MUTING FUNCTION

ML

One-way muting with 2 sensors

Built-in muting sensors with crossed beams

- One-way muting for pallet outfeed.
- 2 photoelectric muting sensors with intersecting beams, built-in pre-wired and pre-aligned.
- Max. time between the 2 muting activation signals: 4 sec.
- Operating range 1 ÷ 2.5 metres.
- Muting sensor elements adjustable in height and angle.
- Max. muting timeout time: 30 sec. or 90 min. selectable.
- Versions with 2 or 3 beams.

Characteristics

- Reduced installation time and costs.
- Sensors positioned in compliance with the regulations regarding the geometry of muting sensors and all the other safety parameters; this makes it possible to avoid dangers arising from positioning errors and from possible tampering.
- The light curtain only allows pallet outfeed.
- The muting function can only be activated from inside the protected zone. No possibility to activate a muting sequence from the outside.
- Elimination of bulk outside the protected area, as the muting sensors are only present inside the area.
- Correct muting sequence even in the presence of a pallet with reduced width and/or length or not centred with respect to the conveyor.

ML_S2 – ML TRX

One-way muting with 2 sensors

Built-in muting sensors with parallel beams

- One-way muting for pallet outfeed.
- 2 photoelectric muting sensors with parallel beams, built-in pre-wired and pre-aligned.
- Max. time between the 2 muting activation signals: 4 sec.
- Operating range: 0 ÷ 2 metres for ML_S2 and 0 ÷ 3.5 metres for ML TRX models
- Muting sensor elements adjustable in height and angle.
- Max. muting timeout time: 30 sec. or 90 min. selectable.
- Versions with 2 or 3 beams and 2 or 3 beams with passive retroreflector elements
- Muting enable input available (ML TRX models only).

Characteristics

- Reduced installation time and costs.
- Sensors positioned in compliance with the regulations regarding the geometry of muting sensors and all the other safety parameters; this makes it possible to avoid dangers arising from positioning errors and from possible tampering.
- The light curtain only allows pallet outfeed.
- The muting function can only be activated from inside the protected zone. No possibility to activate a muting sequence from the outside.
- Elimination of bulk outside the protected area, as the muting sensors are only present inside the area.
- Correct muting sequence even in the presence of a pallet with reduced width and/or length or not centred with respect to the conveyor.

- Muting enable input allows to start a muting sequence only when needed by the machine cycle.

- Special version for transparent materials.
- Ideal for the glass and bottling industry.

JANUS M

WITH MUTING FUNCTION

MT

Two-way muting with 2 sensors

Built-in muting sensors with crossed beams

- Two-way muting for pallet infeed/outfeed.
- 2 photoelectric muting sensors with intersecting beams, built-in pre-wired and pre-aligned.
- Max. time between the 2 muting activation signals: 4 sec.
- Operating range: from 1 to 2.5 metres.
- Muting sensor elements adjustable in height and angle.
- Max. muting timeout time: 30 sec. or 90 min. selectable.
- Versions with 2 or 3 beams.

Characteristics

- Reduced installation time and costs.
- Sensors positioned in compliance with the regulations regarding the geometry of muting sensors and all the other safety parameters; this makes it possible to avoid dangers arising from positioning errors and from possible tampering.
- Standard solution for the most common pallet infeed/outfeed applications.

MT_S4 - MT TRX

Two-way sequential muting with 4 sensors

Built-in muting sensors with parallel beams

- Two-way muting pallet infeed / outfeed.
- 4 photoelectric muting sensors with parallel beams, built-in pre-wired and pre-aligned.
- Max. time between the muting activation signals: 4 sec. or infinite, selectable.
- Operating range: 0 ÷ 2 metres for MT_S4. and 0 ÷ 3.5 metres for MT TRX models
- Muting sensor elements adjustable in height and angle.
- Max. muting timeout time: 30 sec. or infinite, selectable.
- Versions with 2 or 3 beams and 2 or 3 beams with passive retroreflector elements
- Muting enable input available (MT TRX models only).

Characteristics

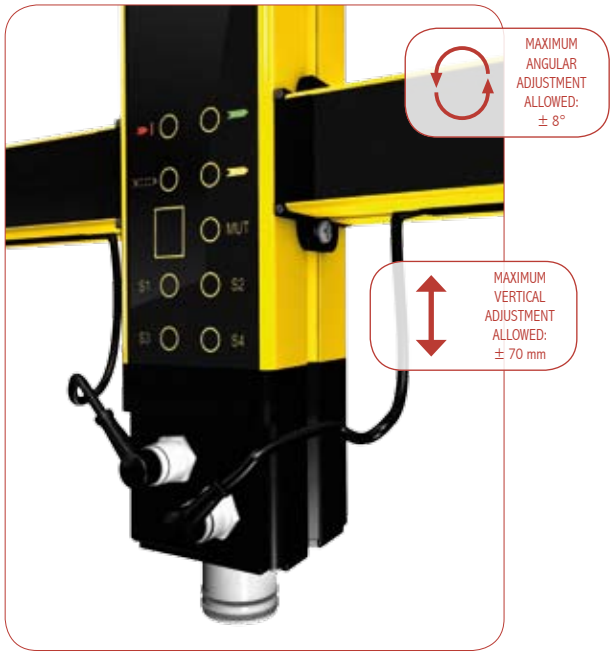
- Reduced installation time and costs.
- Sensors positioned in compliance with the regulations regarding the geometry of muting sensors and all the other safety parameters; this makes it possible to avoid dangers arising from positioning errors and from possible tampering.
- Correct muting sequence even in the presence of a pallet with reduced width or not centred with respect to the conveyor.
- Possibility of two-way transit of the pallets and simultaneous protection in the two directions against unauthorised access of personnel.
- Muting enable input allows to start a muting sequence only when needed by the machine cycle.

- Special version for transparent materials.
- Ideal for the glass and bottling industry.

JANUS M

WITH MUTING FUNCTION

SENSOR ELEMENT ADJUSTMENT · ML and MT versions

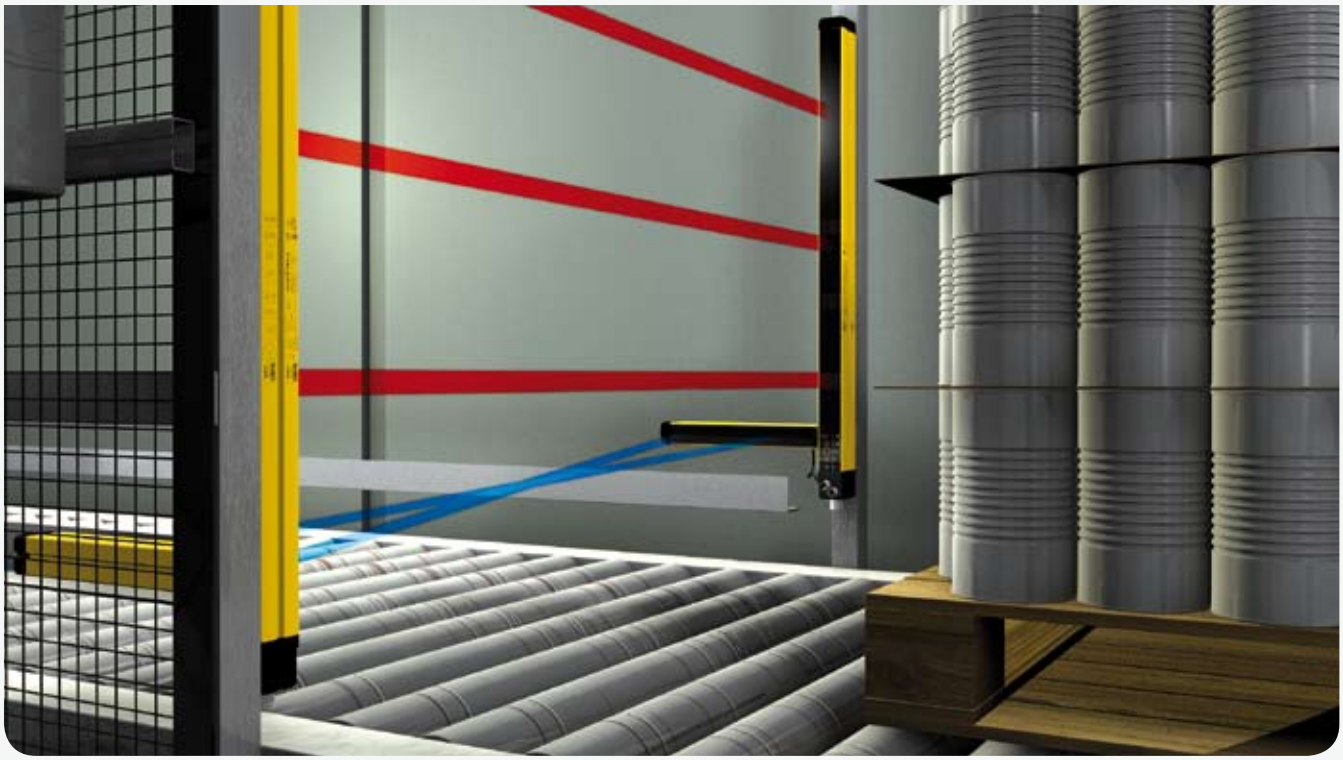


The sensor elements present in the Janus ML and MT versions are adjustable in height and angle.

This important and unique feature enables:

- the inclination of the detection plane of the sensors to obtain correct and constant detection of irregular materials in transit.
- the variation of the intensity of the sensor signal for better detection of semitransparent objects.

Example of application of Janus ML light curtain for protection of palletiser outfeed zone



JANUS J

WITH BUILT-IN CONTROL FUNCTIONS

MAIN FEATURES

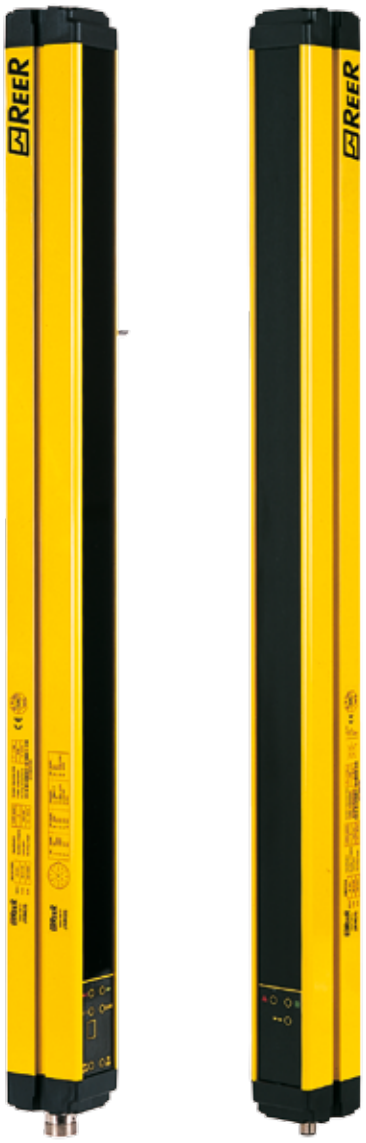
Two self-testing solid state PNP safety outputs.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).
All configuration via hardware by means of main connector. Use of standard cables up to 100 m long.

J Long Range models available, with range up to 60 m, for access control with 2-3-4 beams or with resolution 40 mm, also ideal for perimeter protection with the use of deflection mirrors.

FMC floor mounting columns available.

MJ Box for quick connection of the light curtains and availability of the restart command in the area of the protected gate.

Special models in conformity with the **"ATEX Directive"** 94/9/CEE – Dust Zone 22 - Gas Zone 2 available on request.



Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive".
- 89/336/EEC "Electromagnetic Compatibility Directive".
- 73/23/EEC "Low Voltage Directive".
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices".
- UL (C + US) mark for USA and Canada.
- ANSI / UL 1998 "Safety Software in Programmable Components".

JANUS J

WITH BUILT-IN CONTROL FUNCTIONS

TECHNICAL FEATURES

Safety	Type 4
Protected heights mm	510 ÷ 1210
Resolutions mm	40 (long range only)
Number of beams for body detection in access control	2 – 3 – 4
Max range m	selectable 6 -16 selectable 30-60 for long range models
Response time ms	7 ÷ 28,5
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Light curtain status indication and weak signal output	PNP – 100 mA at 24 Vdc
Signalling	seven-segment display and LEDs for light curtain's status and diagnostic
Restart	automatic or manual, selectable
External Device Monitoring	External device monitoring feedback input with enabling selectable
Power supply Vdc	24 ± 20%
Electrical connections	M12 - 5 poles for emitter M23 - 19 poles for receiver
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	back or side slot
Cross section mm	50 x 60

J 2 – 3 – 4 beams	J 2B	J 3B	J 4B
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	736	1036	1136
Max. range m	selectable 6 -16		

J Long Range 2 – 3 – 4 beams	J 2B LR	J 3B LR	J 4B LR
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	736	1036	1136
Max. range m	selectable 30 - 60		

J Long Range Resolution 40 mm	J 604 LR	J 904 LR	J 1204 LR
Protected heights mm	610	910	1210
Number of beams	30	45	60
Overall height mm	736	1036	1336
Max. range m	selectable 30 - 60		

• For accessories list see page 69
• For ordering codes see page 131

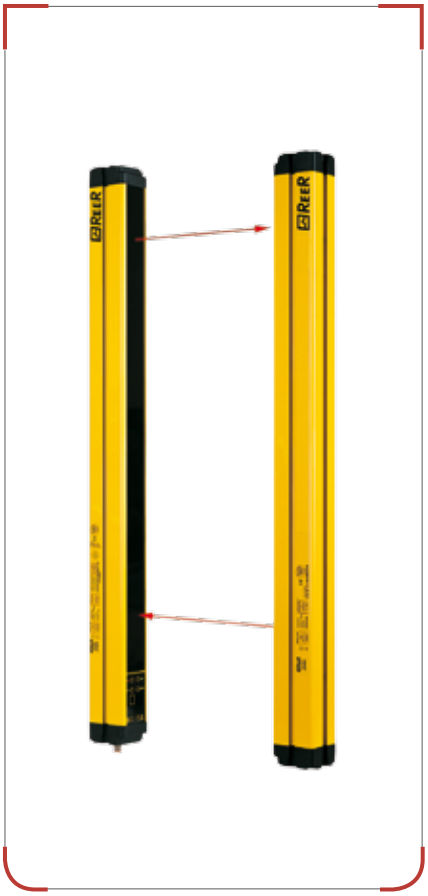
JANUS J TRX

WITH BUILT-IN CONTROL FUNCTIONS AND PASSIVE RETROREFLECTOR ELEMENT

MAIN FEATURES

Passive optical retroreflector element.
Two self-testing solid state PNP safety outputs.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).
All configuration via hardware by means of the M12 (J 2B TRX model) or M23 (J 2B TRXL and J 3B TRXL) connector.
Use of standard cables, up to 100 m long.
JANUS series J TRX is a safety light grid with 2 or 3 beams composed of an active emitter/receiver element and a **passive retro-reflector element** that **does not require any electrical connection.**
JANUS series J TRX is the simplest and quickest installation solution for detection of a person in access control in hazardous areas, and the ideal solution for all applications in which it is difficult or costly to cable electrical lines.

Special models in conformity with the **"ATEX Directive"** 94/9/CEE – Dust Zone 22 - Gas Zone 2 available on request.



Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive".
- 89/336/EEC "Electromagnetic Compatibility Directive".
- 73/23/EEC "Low Voltage Directive".
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices".
- UL (C + US) mark for USA and Canada.
- ANSI / UL 1998 "Safety Software in Programmable Components".

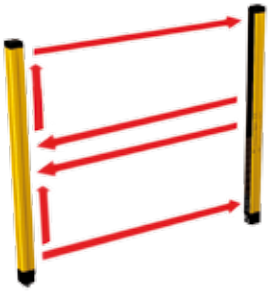
TECHNICAL FEATURES

Safety	Type 4
Number of beams for body detection in access control	2-3 (TRXL version only)
Max range m	6
Response time ms	7
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	seven-segment display and LEDs for light curtain's status and diagnostic
Restart	automatic or manual, selectable
External Device Monitoring	external device monitoring feedback input with enabling selectable
Power supply Vdc	24 ± 20%
Electrical connections	active element: M12 -8-poles for J 2B TRX model M23 -19 poles for J_B TRXL models
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	back or side slot
Cross section mm	50 x 60

JANUS J TRX

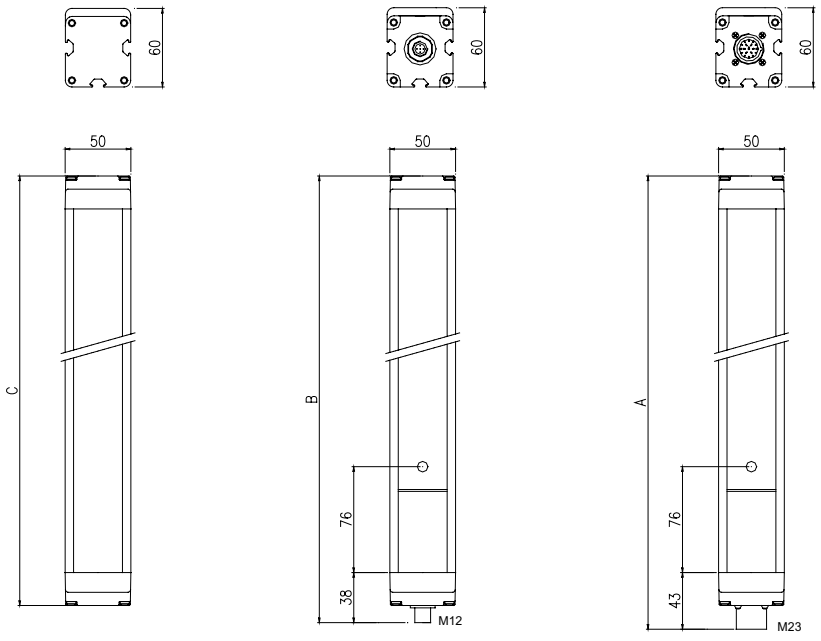
WITH BUILT-IN CONTROL FUNCTIONS AND PASSIVE RETROREFLECTOR ELEMENT

Model	J 2B TRX	J 2B TRXL	J 3B TRXL
Number of beams	2	2	3
Distance between beams mm	500	500	400
Protected heights mm	510	510	810
Connector	M12 8 poles	M23 19 poles	M23 19 poles
Overall height mm	736	741	1041
Max. range m	6	6	6



DIMENSIONS mm

DIMENSION	2B	3B
A	741	1041
B	736	-
C	723	1023



PASSIVE ACTIVE J TRX ACTIVE J TRXL

• For accessories list see page 69
• For ordering codes see page 131

JANUS J WT

WITH IP 67 WATERTIGHT HOUSING

MAIN FEATURES

The **WT watertight housing** enables the use of Janus light curtains in harsh working environments characterised by the presence of water, steam, and low temperatures.

This solution is ideal for applications in the food processing industry and in washing systems, including those under pressure.

Models are available for protecting light curtains with protected height from 160 to 1810 mm.

TECHNICAL FEATURES

All the main technical features are the same of JANUS J

Protection rating	IP 67
Operating temperature °C	0 ÷ 55
Max water pressure (jets)	40 bar (with temperature from 10° to 40°)
Max range m	selectable 4 – 14 selectable 25-50 for long range models
Available Resolution mm	40 (long range only)
Number of beams for body detection in access control	2 – 3 - 4
Light curtain electrical connections	cable 10 metres pre-wired with cable gland
Fastening	by means of set of 4 WFB ring brackets (included)
Dimensions mm	Total light curtain height + 124 x 95 Ø

MODELS

J WT Long Range 2 – 3 – 4 beams	J 2B LR WT	J 3B LR WT	J 4B LR WT
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	900	1200	1300
Max range m	selectable 25 - 50		

J WT Long Range Resolution 40 mm	J 604 LR WT	J 904 LR WT	J 1024 LR WT
Protected heights mm	610	910	1210
Number of beams	20	30	40
Overall height mm	900	1200	1300
Max range m	selectable 25 - 50		

- The light curtains are supplied already housed in the WT watertight housings.
- Cables and ring brackets are included in the kit.

Please contact Reer preventively to assess adequacy to your application.

- For accessories list see page 69
- For ordering codes see page 131

JANUS MJB

CONNECTION BOX FOR JANUS SAFETY LIGHT CURTAINS

The Janus MJB boxes are accessory devices designed to make the wiring of the Janus light curtains fast and safe, and to provide the main controls necessary for their operation close to the protected gate.

MAIN FEATURES

- Lighted button for light curtain restart with green LED for indicating output status and weak signal.
- Key selector controlling the override function.
- Indicator lamp for muting function active.
- Connector for connection to the light curtain receiver.
- Connector for connection to the light curtain emitter.
- Dipswitches for configuration of light curtain functions.
- Built-in safety relay with guided contacts driven and controlled by the light curtain.
- Internal terminal blocks for cable connections.
- Selector for connection of external muting lamp.
- Selector for internal or external relay control.
- Connection with cable gland for cable passage in output towards the machine.
- Versions without restart and override commands for connection with Janus J light curtain without muting.
- Special models in compliance with the "ATEX Directive" 94/9/CEE – Dust Zone 22.

TECHNICAL FEATURES

MODELS	MJB 1	MJB 2	MJB 3	MJB 4
Restart button	yes	yes	yes	yes
Override command	yes	no	yes	no
Built-in Muting lamp	yes	no	yes	no
Safety relay output	2 NO 2A 250 Vac	2 NO 2A 250 Vac	2 NO + 1 NC* 2A 250 Vac	2 NO + 1 NC* 2A 250 Vac
Connectors	M12 - 5 poles for emitter / light curtain connection M23 - 19 poles for receiver / light curtain connection			
Dimensions - h x w x d - mm	110 x 180 x 110			

* in MJB 3 and MJB 4 boxes each NO safety output line is interrupted twice by the two relays

MJB 1 - MJB 3

MJB 2 - MJB 4

- All MJB connection boxes can work with any kind of Janus light curtain (with or without muting).
- Using muting versions of Janus light curtains with MJB2 and MJB4 models it is necessary to connect an external muting lamp.

• For accessories list see page 69
• For ordering codes see page 131

JANUS SL

ACCESSORY MUTING SENSOR ELEMENTS FOR JANUS MI

MAIN FEATURES

The SL series accessory muting sensor elements (arms) can be combined with the Janus MI light curtain model, making it possible to create an "L" barrier with built-in sensors with 30, 40, 90 mm resolution and protected height from 310 to 1810 mm.

- The SL and S2L models have 2 built-in sensors, pre-wired and pre-aligned, with intersecting or parallel beams.

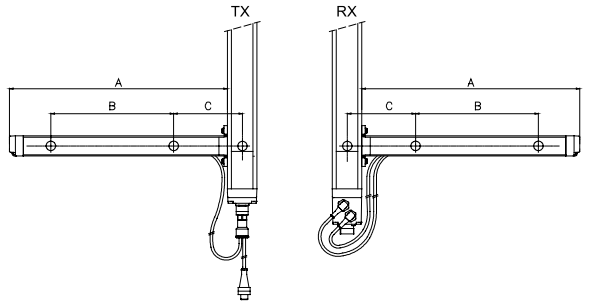
The S1L model - with only one beam – is designed to create a special mixed system composed of **a single in-field sensor**, while the second muting signal will be supplied by the machine according to a dedicated logic sequence. This system is useful for the infeed of **materials with reduced or irregular dimensions** that cannot be managed with normal sensors with intersecting or parallel beams.

TECHNICAL FEATURES

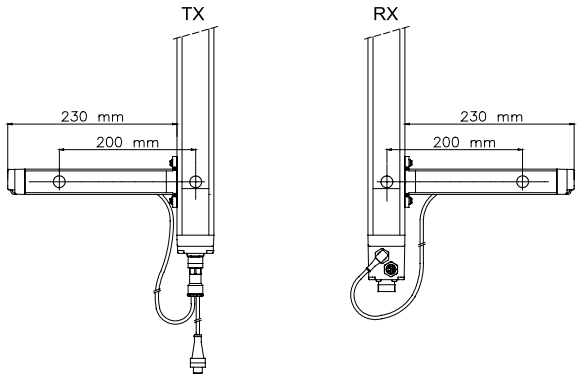
MODELS	SL	S2L	S1L
Optoelectronic sensors	2 crossed beams	2 parallel beams	1
Operative range	1 ÷ 2,5	0 ÷ 2	0 ÷ 2

DIMENSION	SL	S2L
A	330 mm	370 mm
B	300 mm	250 mm
C	50 mm	84 mm

SL and S2L Models



S1L Model



WARNING !

The use of the S1L sensor unit enables the infeed of pallets or materials with reduced or irregular dimensions, solving a precise application problem. In fact, the irregular dimensions of the load do not permit a sure discrimination between man and material only by using in-field sensors positioned in the usual way (e.g. with 2 intersecting beams and 4 parallel beams); as a consequence there would be a risk of activating anomalous muting sequences and the consequent shutdown of the machine.
The system must therefore be composed of a Janus MI light curtain configured with "L" logic and the S1L accessory sensor element - with only one beam – that generates the S2 signal. The S1 signal will be generated by the machine (for example by the PLC) upon a logical series of conditions that must not derive only from the sensors in the field. In this way it is possible to obtain correct material / man discrimination and prevent the signal from being generated by the presence of personnel at the protected gate, with the serious risks that could ensue.

JANUS

ORDERING INFORMATION (for ordering codes see page 130)

Each Janus light curtain comprises:

- Emitter and Receiver pair, including integrated sensor (only for L and MT models)
- Emitter / Receiver active element + passive reflector element (only for models M_TRX and J_TRX)
- Mounting brackets and T-nuts
- CD-ROM containing the multi-language instruction manual complete with CE declaration of conformity

ACCESSORIES

For Janus light curtains the following accessories, to be ordered separately, are available:

• AD SR Safety Relays	see page 106
• LAD laser alignment device	see page 124
• FMC floor mounting columns	see page 120
• MJB connection box	see page 67
• SL accessory muting sensors element	see page 68
• SP deflection mirrors	see page 122
• SAV vibrations dampers	see page 125
• Connectors	see below:

CONNECTORS FOR RECEIVERS / TRX MODELS ACTIVE ELEMENT

Model	Features
CJ 3	M23 straight connector, 19 poles, pre-wired cable 3 m
CJ 5	M23 straight connector, 19 poles, pre-wired cable 5 m
CJ 10	M23 straight connector, 19 poles, pre-wired cable 10 m
CJ 15	M23 straight connector, 19 poles, pre-wired cable 15 m
CJ 20	M23 straight connector, 19 poles, pre-wired cable 20 m
CJM 23	M23 straight connector, 19 poles, cable gland (to be welded)

CONNECTORS FOR EMITTERS

Model	Features
CD 5	M12 straight connector, 5 poles, pre-wired cable 5 m
CD 10	M12 straight connector, 5 poles, pre-wired cable 10 m
CD 15	M12 straight connector, 5 poles, pre-wired cable 15 m
CD 20	M12 straight connector, 5 poles, pre-wired cable 20 m
CDM 9	M12 straight connector, 5 poles, with screw terminal, cable gland

CABLES WITH 2 CONNECTORS FOR JANUS RECEIVERS / TRX MODELS ACTIVE ELEMENT AND MJB BOXES CONNECTION

Model	Features
CJBR 3	3 m pre-wired cable with 2 straight connectors, M23, 19 poles
CJBR 5	3 m pre-wired cable with 2 straight connectors, M23, 19 poles
CJBR 10	10 m pre-wired cable with 2 straight connectors, M23, 19 poles

JANUS

ACCESSORIES

CABLES WITH 2 CONNECTORS FOR JANUS EMITTERS AND MJB BOXES CONNECTION

Model	Features
CJBE 3	3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 5	3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 10	10 m pre-wired cable with 2 straight connectors, M12, 5 poles

CONNECTORS FOR MUTING SENSORS - JANUS MI SERIES

Model	Features
CJ 95	M12 90° angled male connector, 5 poles, pre-wired cable 5 m
CJM 9	M12 90° angled male connector, 5 poles, with screw terminal, cable gland PG9

CONNECTORS FOR J 2B TRX MODEL ACTIVE ELEMENT ONLY

Model	Features
C8D 5	M12, straight connector, 8 poles, pre-wired cable 5 m
C8D 10	M12, straight connector, 8 poles, pre-wired cable 10 m
C8D 15	M12, straight connector, 8 poles, pre-wired cable 15 m
C8D 95	M12, 90° angle connector, 8 poles, pre-wired cable 5 m
C8D 910	M12, 90° angle connector, 8 poles, pre-wired cable 10 m
C8D 915	M12, 90° angle connector, 8 poles, pre-wired cable 15 m
C8DM 9	M12, straight connector, 8 poles with screw terminal, PG9 cable gland
C8DM 99	M12, angle connector, 8 poles with screw terminal, PG9 cable gland
C8DM 11 | new	M12, straight connector, 8 poles with screw terminal, PG9/11 cable gland
C8DM 911 | new	M12, angle connector, 8 poles with screw terminal, PG9/11 cable gland

WARNING !

- In perimeter and/or long-range applications and with the use of deflection mirrors, we recommend using the LAD laser alignment device to obtain a simple, quick, and correct alignment of the light curtains.
- In perimeter and/or long-range applications and with the use of deflection mirrors, we recommend using the FMC adjustable floor mounting columns.
- If the light curtain system is subject to strong vibrations (applications on presses, etc.), it is necessary to use the special SAV vibration dampers, available as accessories, to prevent mechanical damage to the light curtain elements.

JANUS

DIMENSIONS mm

Models "J"

DIMENSION	16 m range			Long Range					
	2B	3B	4B	600	900	1200	2B	3B	4B
A (TX-RX)	736	1036	1136	736	1036	1336	736	1036	1136
B (protected heigth)	510	810	910	610	910	1210	510	810	910
C (1st beam position)	120			76					

Models "MI"

DIMENSION	16 m range														Long Range		
	300	450	600	750	900	1050	1200	1350	1500	1650	1800	2B	3B	4B	2B	3B	4B
A (TX)	436	586	736	886	1036	1186	1336	1486	1636	1786	1936	736	1036	1136	736	1036	1136
A (RX)	476	626	776	926	1076	1226	1376	1526	1676	1826	1976	776	1076	1176	776	1076	1176
B (protected heigth)	310	460	610	760	910	1060	1210	1360	1510	1660	1810	510	810	910	510	810	910
C (1st beam position)	72											120			76		

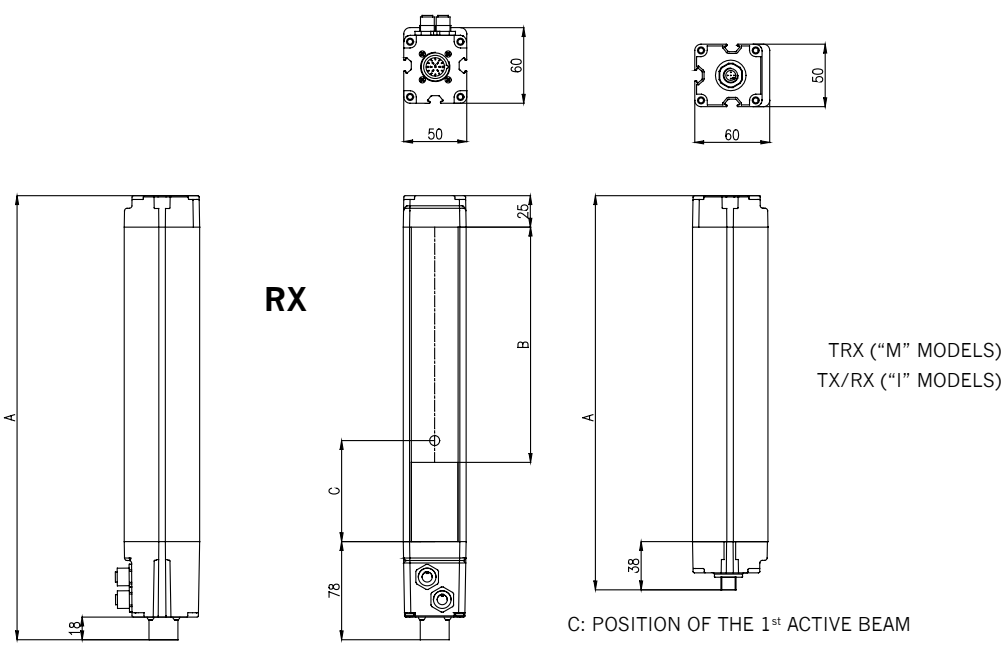
Models "ML", "MT"

DIMENSION	2B	3B
A (TX-RX)	776	1076
B (protected heigth)	510	810
C (1st beam position)	120	

Mounting:
Models with A ≤ 1050 2 LL brackets with 2 inserts
Models with A ≥ 1200 3 LL brackets with 3 inserts

JANUS

JANUS “MI” - “J”

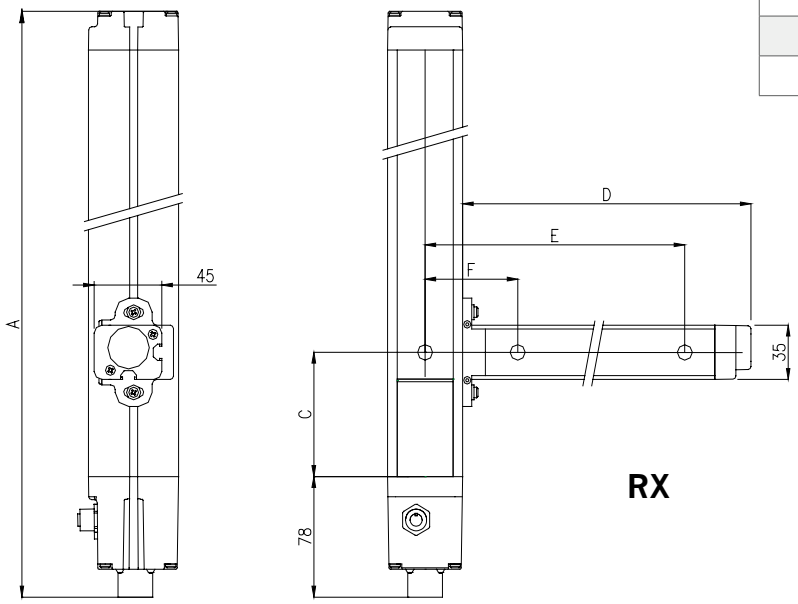


TRX (“M” MODELS)
TX/RX (“I” MODELS)

C: POSITION OF THE 1st ACTIVE BEAM

JANUS “ML”

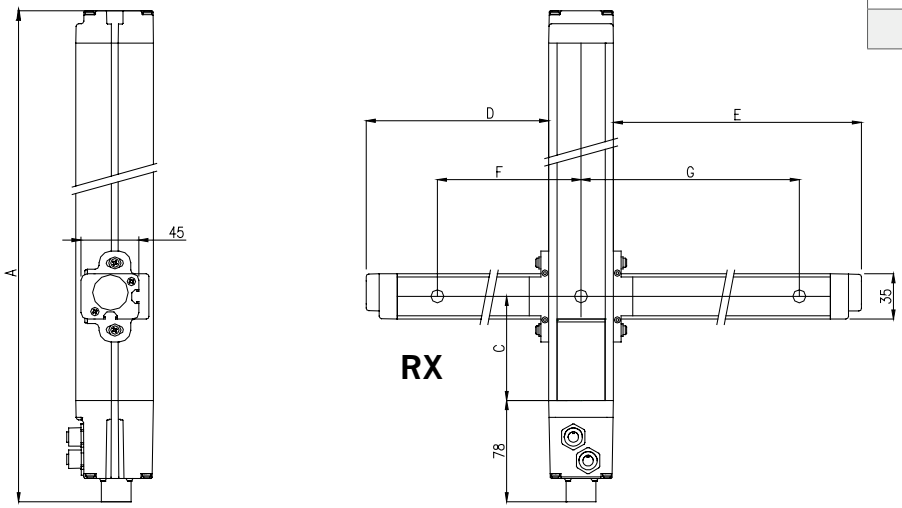
DIMENSION	ML
D	330
E	300
F	50



JANUS

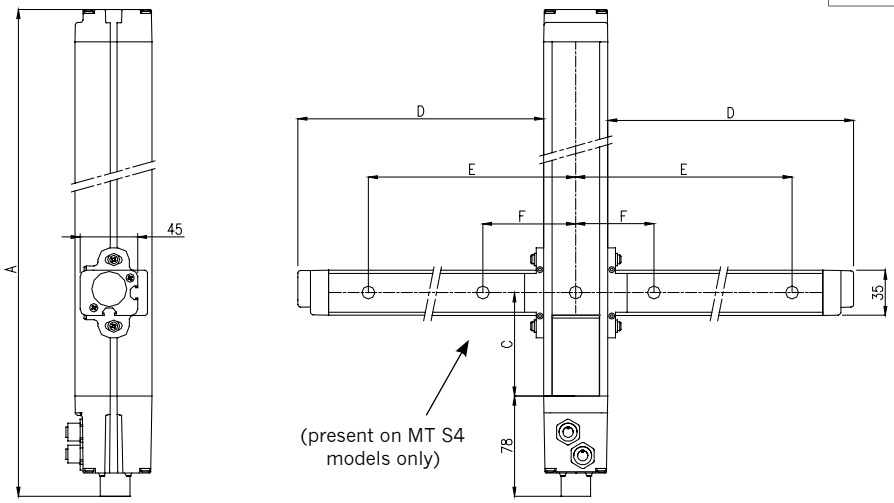
JANUS “MT”

DIMENSION	MT
D	230
E	330
F	200
G	300



JANUS “ML S2” - “MT S4”

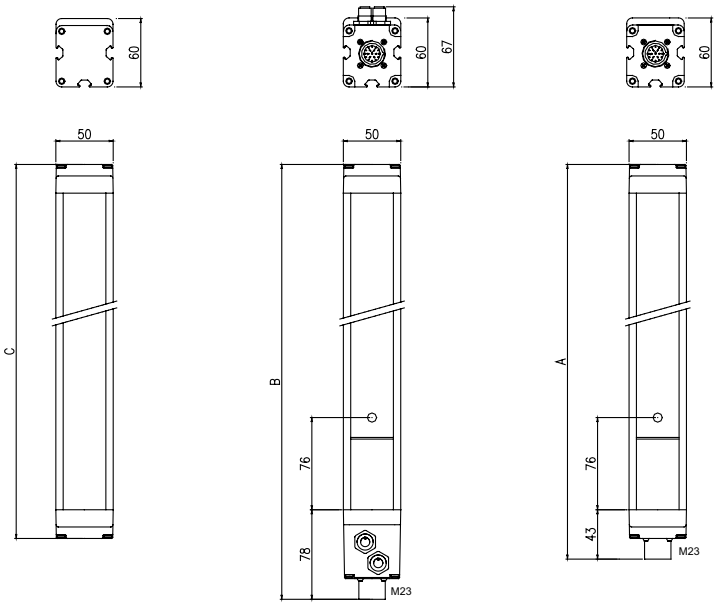
DIMENSION	ML S2 / MT S4
D	370
E	334
F	84



JANUS

JANUS “MI TRX”

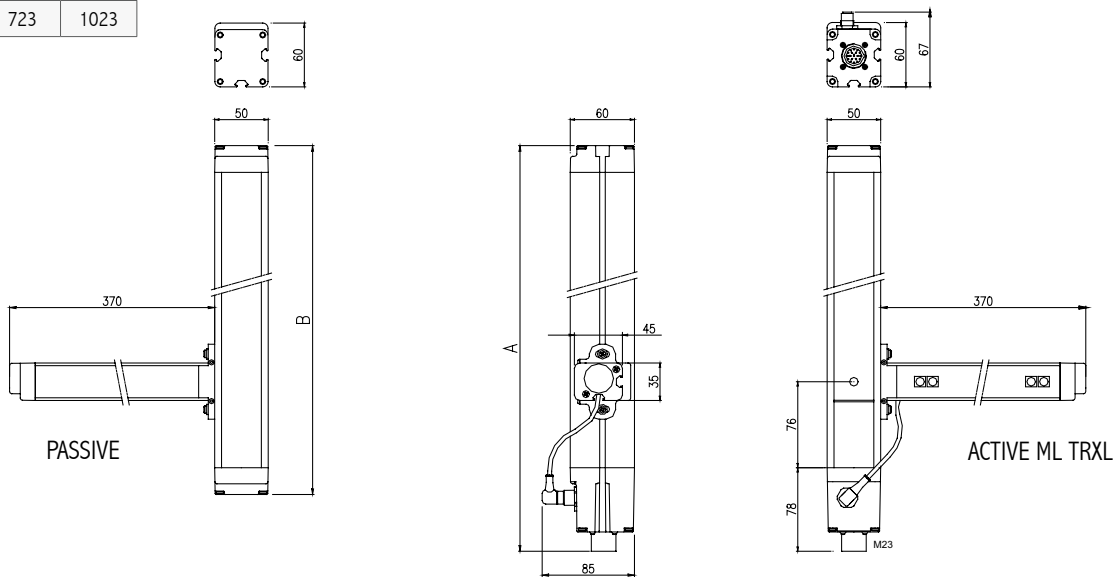
DIMENSION	2B	3B
A	741	1041
B	776	1076
C	723	1023



PASSIVE ACTIVE MI TRX ACTIVE MI TRXL

JANUS “ML TRX”

DIMENSION	2B	3B
A	776	1076
B	723	1023

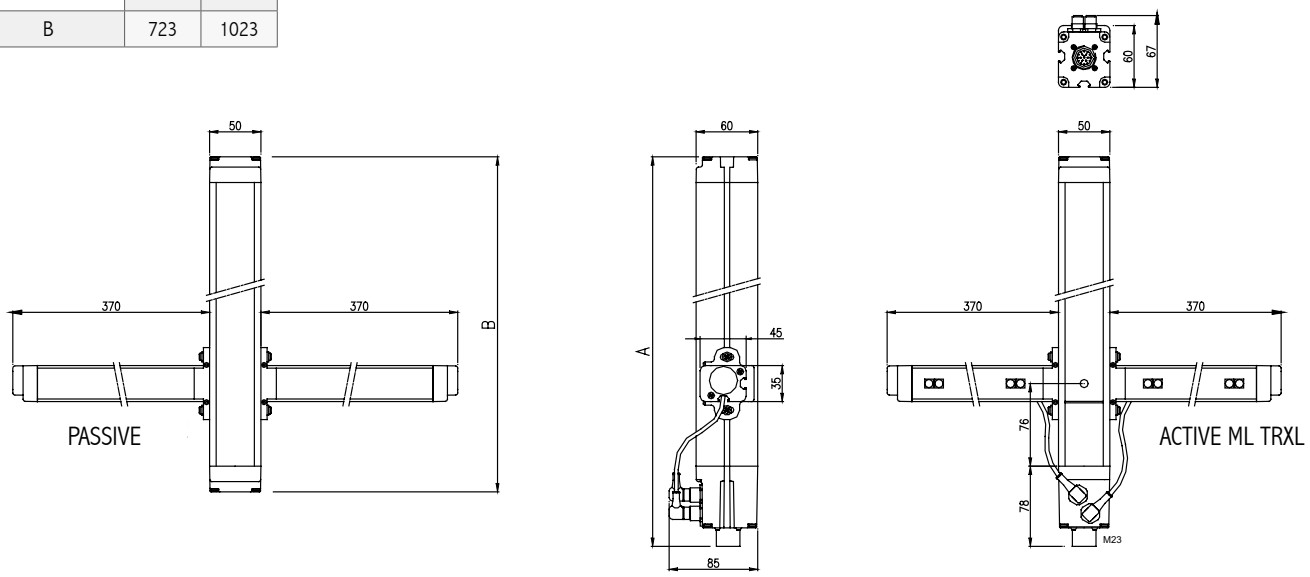


PASSIVE ACTIVE ML TRXL

JANUS

JANUS “MT TRX”

DIMENSION	2B	3B
A	776	1076
B	723	1023



PHARO

http://pharo.reer.it

PHARO

The PHARO Safety Laser Scanner is an optoelectronic protection device for accident prevention.
PHARO is suitable for the protection of personnel exposed to risks deriving from both machines and systems with dangerous organs as well as from possible collisions with automatic guided vehicles (AGVs).

With the PHARO Safety Laser Scanner it is possible to create **programmable protected horizontal or vertical areas** of variable shape suitable to all applications without the need to use a separate reflector or receiver.

The device does not require an external control unit because **all the safety functions are built-in**.

The PHARO Safety Laser Scanner features a **Configuration Memory Module** built into the removable connector, which stores the data related to the protected zones programmed and to the operating parameters set.
This module enables the user to replace a faulty sensor with a new device without the need for reconfiguration and therefore maintaining the pre-existing configuration, without the possibility of errors or tampering.
The stored data can only be modified by authorised personnel.

It is also possible to use the data measured by the scanner to aid the navigation of AGV automatic guided vehicles or for dimensional detection of objects.

Each sensor can create **2 independently programmable controlled zones**:
• 2 safety zones with maximum radius of 4 metres
• 2 warning zones with maximum radius of 20 metres.

Certified by TÜV Rheinland Product Safety GmbH

Safety level: **Type 3**
SIL 2 according to IEC 61508.
Complying with:
- 98/37/EEC “Machine Directive”.
- 89/336/EEC “Electromagnetic Compatibility Directive”.
- 73/23/EEC “Low Voltage Directive”.
- EN 61496-1 and IEC 61496-1-3 “Electrosensitive protection devices”.
- IEC 61508 “Functional safety of electrical/electronic/programmable electronic safety-related systems”.
- UL (C + US) mark for USA and Canada.

MAIN FEATURES

Scanning area: 190° / 4 m radius.
Resolution configurable from 30 mm to 150 mm: from hand detection to access control.
Configuration software via RS232 serial port
2 safety zones and 2 warning zones, programmable.
Programming by means of:
1. graphic user interface
2. teach-in
3. data transfer from file
(from PC or from another laser scanner).

Configuration Memory Module for easy re-installation.
Detailed self-diagnosis via display and remote serial output.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).

Model:	PHR 332
Protective (safety) fields	2
Warning fields	2
Memory Configuration Module	Yes

PHARO

GENERAL TECHNICAL DATA

Safety	Type 3
SIL according to IEC 61508	2
Light source	Laser diode wavelength 905 nm
Laser source class	1 - according to EN 60825-1
Scanning angle	190°
Angular resolution	0,25° / 0,50°
Response time ms	configurable 60 / 120 (with 2 scans)
Restart	Automatic - timed automatic - manual reset (selectable via software)
Serial interface - configuration	RS 232
Serial interface - data transmission	RS 422
Configuration and operating parameter setting	via configuration software (UCS)
Configuration Memory Module	built into the main connector
Signalling	Display indications in 7 segments and LEDs for self-diagnosis and sensor status
Power supply Vdc	24 -30% +20%
External relay control	feedback input with enabling, selectable
Main connection	connector with screw terminals (13-pole cable)
Serial interface connection for configuration	cable pre-wired with 2 connectors: M8 4-pole / subD 9-pole
Electrical connections	cable length 30 m, cross-section 0.5 mm²
Protection rating	IP 65
Operating temperature °C	-10 / +50

SAFETY ZONE

Max range m (radius)	4
Resolution mm	30 - 40 - 50 - 70 - 150 configurable
Min. target reflectivity	1,8%
Safety outputs	2 PNP self-testing - 500 mA at 24Vdc

WARNING ZONE

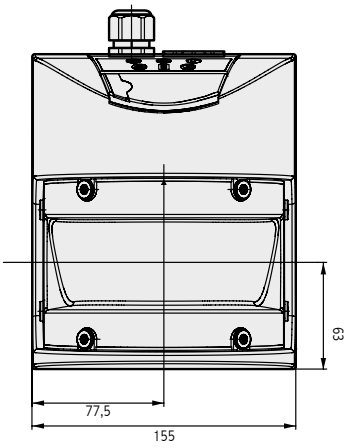
Max range m (radius)	20 (for objects with 20% reflectivity)
Resolution mm	depending on the distance of the obstacle
Min. target reflectivity	20% at 20 m
Signalling outputs	1 PNP – 200 mA at 24 Vdc

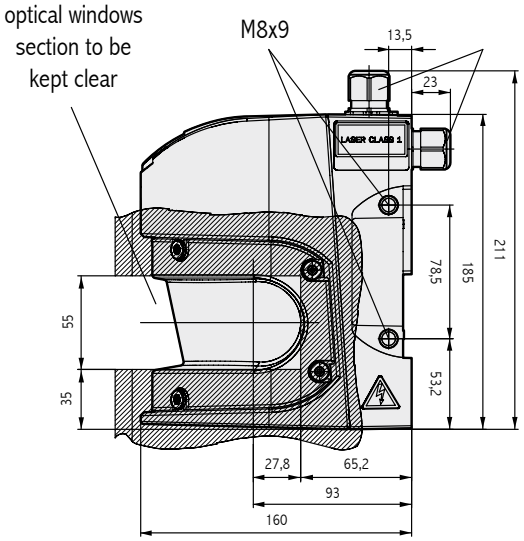
MEASUREMENT ZONE

Max range m (radius)	49
Resolution mm	depending on the distance of the target
Signalling output	1 PNP – 200 mA at 24 Vdc
Data transmission output	RS422 Serial with dedicated protocol

PHARO

DIMENSIONS mm

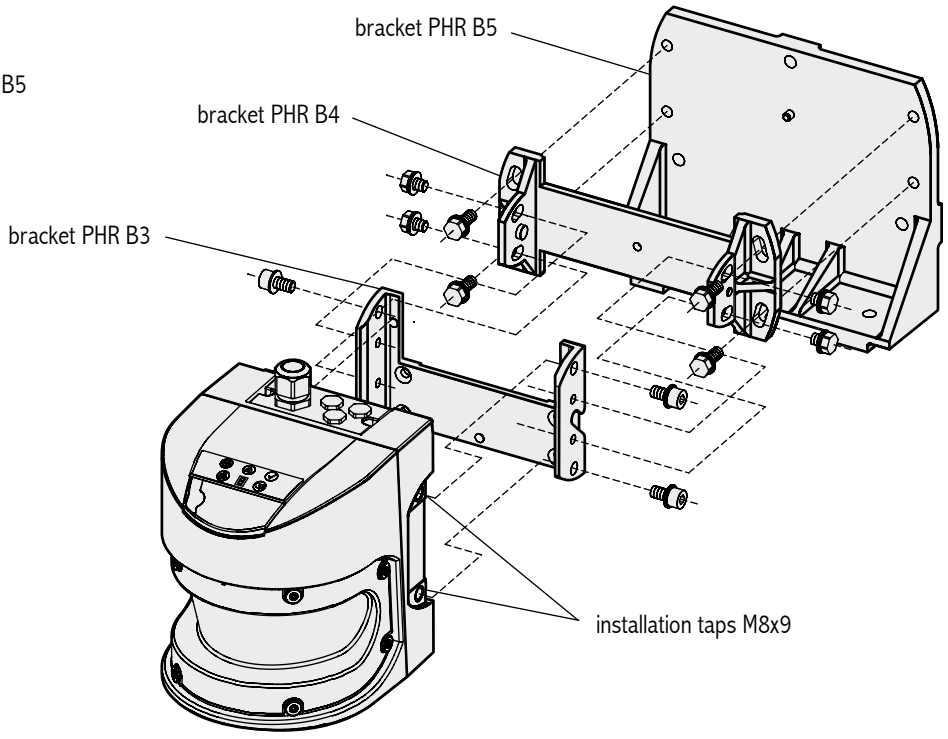




INSTALLATION ACCESSORIES

Special installation brackets are available for Pharo:

- Fixed bracket PHR B3
- Adjustable bracket PHR B4
- Floor mounting bracket PHR B5



PHARO

ORDERING INFORMATION (ordering codes on page 131)

Each Pharo Laser Scanner includes:

- PHR 332 Laser Scanner
- CD-ROM containing configuration software in English and Italian and multi-language instruction manual complete with CE declaration of conformity

ACCESSORIES

The following accessories are available for Pharo, to be ordered separatel:

Model	Description
PHR C3L5	30-pole connector pre-wired with 13-wire cable 5 m long Built-in Configuration Memory Module
PHR CSL2	cable for serial connection between Pharo sensor and PC for configuring M8 4-pole / subD 9-pole connector, length 2 m
PHR B3	fixed attachment bracket
PHR B4	adjustable attachment bracket
PHR B5	floor mounting bracket

WARNING !

- For the main connection of the Pharo sensor, it is necessary to provide a 13-wire cable with 0.56 mm2 cross-section. This cable is supplied with the PHR C3L5 main connector.
- To use the PHR B4 adjustable bracket it is also necessary to order the PHR B3 fixed bracket.
- To use the PHR B5 floor mounting bracket it is also necessary to order the PHR B3 fixed bracket and the PHR B4 adjustable bracket.
- AD SR0 and AD SR0A relay modules can be used for interfacing the safety output of Pharo Laser Scanner.

VISION

VISION

The **Vision** Type 2 family of safety light curtains is the ideal solution for the protection of the majority of industrial applications in Category 2.

Its features include:

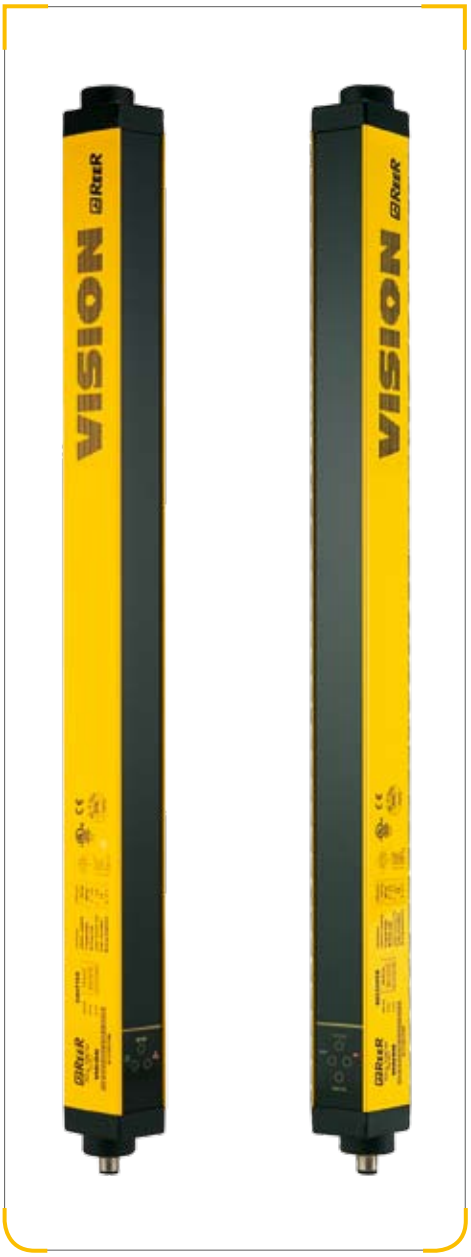
- Extremely **easy connection** and installation, thanks to the M12 connectors and the use of standard cables.
- Integration of the main safety functions, including self monitoring of the safety circuits and, only for the VX / VXL / MXL models, external device monitoring (EDM) and the Start / Restart interlock function.
- The built-in **auto-test** function, activated automatically and periodically, without interruption of the operation of the machine being controlled.
- The breadth of the range, including Master / Slave models for cascade connection of two light curtains, the VXL models, with the lowest cost/performance ratio and the MXL models with built-in muting function.
- The utmost reliability in the field, thanks to the rugged construction and to the high level of immunity to external disturbances (optical, EMC, etc.).

Each light curtain of the Vision series can be connected to the dedicated safety interfaces of the Admiral ADSR series, or directly to contactors controlled by the light curtain, or to safety PLC or suitable commercial safety modules.

New | Special versions in WT watertight housing (see page 69) available on request.

New | The AS-i connection interface AS-i CI5 (see page 123) is now available.

Special models in conformity with the **"ATEX Directive"** 94/9/CEE – Dust Zone 22 - Gas Zone 2 available on request.



VISION

THE VISION RANGE

VISION V

- 6 types of detection:
- resolution 20 - 30 - 40 mm for hand detection
- resolution 50 - 90 mm for detection of the body in a hazardous area
- 2 - 3 - 4 beams for detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Automatic restart
- Electrical connections with 5-pole M12 connectors

The ideal Type 2 light curtain is ideal for a simple interface with safety modules or PLC.

VISION VX

- 6 types of detection:
- resolution 20 - 30 - 40 mm for hand detection
- resolution 50 - 90 mm for detection of the body in a the hazardous area
- 2 - 3 - 4 beams detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Electrical connections with 5-pole M12 connectors for emitter and 8-pole M12 connectors for receiver
- Built-in manual or automatic restart selectable
- Feedback input for control of external relays (EDM)
- Master and Slave models for serial connection of two light curtains even of different height and resolution

The ideal Type 2 light curtain for directly controlling and monitoring the circuits of the machine, without the need for external safety modules. The Master / Slave models are also the ideal solution for connecting two light curtains in series and constituting a combined detection of the hand and of the presence of a person or of two different sides of the machine.

VISION VXL

- 3 types of detection:
- resolution 30 - 40 mm for hand detection
- 2 - 3 - 4 beams for detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Electrical connections with 5-pole M12 connectors for emitter and 8-pole M12 connectors for receiver
- Built-in manual or automatic restart selectable
- Feedback input for control of external relays (EDM)

Vision VXL, similar to the VX models but available in a limited number of versions and with max. range of 8 metres; especially conceived to satisfy the most frequent application needs at a very competitive price.

VISION MXL | new

- Built-in muting function with 2 sensors operating logic
- 3 types of detection:
- resolution 30 - 40 mm for hand detection
- 2 – 3 - 4 beams for detection of the body in access control
- 2 self-testing solid state PNP safety outputs protected against short circuits and overloads
- Electrical connections with 5-pole M12 connectors for emitter and 12-poles M16 connectors for receiver
- Built-in manual or automatic restart selectable
- Feedback input for control of external relays (EDM)

Vision MXL - following the same approach as the VXL series – can offer a complete range of essential functions and satisfy the most common application needs where the muting function is required, together with a very competitive price.

VISION V

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
Periodic auto-test every 0.5 sec.
All connections and configuration by means of M12 connectors.
Use of standard 5-pole cables, up to 100 m long.
Suppression of optical interference by means of range selection.
Start/restart interlock and EDM via external ADSR1 interface.

TECHNICAL FEATURES

Safety	type 2 with periodic auto-test every 0.5 sec.
Protected heights mm	160 ÷ 1810
Resolutions mm	20 - 30 - 40 - 50 - 90
Number of beams for body detection in access control	2 - 3 - 4
Max range m	6 for V…L models 16 for V…H models
Response time ms	5,5 ÷ 28
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	LEDs for light curtain's status and diagnostic
Restart	automatic
Power supply Vdc	24 ± 20%
Electrical connections	M12 - 5 poles for emitter and receiver
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45

Safety level: **Type 2**
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

VISION V

Resolution 20 mm	V 152	V 302	V 452	V 602	V 752	V 902	V 1052	V 1202	V 1352	V 1502	V 1652	V 1802
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911
Max. range m	6 (V...L models) - 16 (V...H models)											

Resolution 30 mm	V 153	V 303	V 453	V 603	V 753	V 903	V 1053	V 1203	V 1353	V 1503	V 1653	V 1803
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911
Max. range m	6 (V...L models) - 16 (V...H models)											

Resolution 40 mm	V 304	V 454	V 604	V 754	V 904	V 1054	V 1204	V 1354	V 1504	V 1654	V 1804
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911
Max. range m	6 (V...L models) - 16 (V...H models)										

Resolution 50 mm	V 305	V 455	V 605	V 755	V 905	V 1055	V 1205	V 1355	V 1505	V 1655	V 1805
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	12	16	20	24	28	32	36	40	44	48
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911
Max. range m	6 (V...L models) - 16 (V...H models)										

Resolution 90 mm	V 309	V 459	V 609	V 759	V 909	V 1059	V 1209	V 1359	V 1509	V 1659	V 1809
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	5	7	9	11	13	15	17	19	21	23	25
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911
Max. range m	6 (V...L models) - 16 (V...H models)										

2-3-4 beams	V 2B	V 3B	V 4B
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111
Max. range m	6 (V...L models) - 16 (V...H models)		

• For accessories list see page 97
• For ordering codes see page 131

VISION VX

WITH BUILT-IN CONTROL FUNCTIONS

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
Periodic auto-test every 0.5 sec.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).
All connections and configuration by means of M12 connectors.
Use of standard 5-pole and 8-pole cables, up to 100 m long.
Suppression of optical interference by means of range selection.
Master and Slave models for serial connection of 2 light curtains.
Maximum length of the connections between Master and Slave: 50 metres, with standard cable.

TECHNICAL FEATURES

Safety	type 2 with periodic auto-test every 0.5 sec.
Protected heights mm	160 ÷ 1810
Resolutions mm	20 - 30 - 40 - 50 - 90
Number of beams for body detection in access control	2 - 3 - 4
Max range m	Selectable 6 - 18
Response time ms	5,5 ÷ 28
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	seven-segment display and LEDs for light curtain's status and diagnostic
Restart	automatic or manual, selectable
External Device Monitoring	feedback input
Power supply Vdc	24 ± 20%
Electrical connections for VX and VX Master	M12 - 5 poles for emitter M12 - 8 poles for receiver
Electrical connections between Master and Slave	M12 - 5 poles for emitter and receiver
Max. cable length m	100 (50 between master and slave)
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45

Safety level: **Type 2**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

VISION VX

WITH BUILT-IN CONTROL FUNCTIONS

Resolution 20 mm	VX 152	VX 302	VX 452	VX 602	VX 752	VX 902	VX 1052	VX 1202	VX 1352	VX 1502	VX 1652	VX 1802
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 30 mm	VX 153	VX 303	VX 453	VX 603	VX 753	VX 903	VX 1053	VX 1203	VX 1353	VX 1503	VX 1653	VX 1803
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 40 mm	VX 304	VX 454	VX 604	VX 754	VX 904	VX 1054	VX 1204	VX 1354	VX 1504	VX 1654	VX 1804
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	10	15	20	25	30	35	40	45	50	55	60
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 50 mm	VX 305	VX 455	VX 605	VX 755	VX 905	VX 1055	VX 1205	VX 1355	VX 1505	VX 1655	VX 1805
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	12	16	20	24	28	32	36	40	44	48
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

Resolution 90 mm	VX 309	VX 459	VX 609	VX 759	VX 909	VX 1059	VX 1209	VX 1359	VX 1509	VX 1659	VX 1809
Protected heights mm	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	5	7	9	11	13	15	17	19	21	23	25
Overall height mm	411	561	711	861	1011	1161	1311	1461	1611	1761	1911

2-3-4 beams	VX 2B	VX 3B	VX 4B
Number of beams	2	3	4
Distance between beams mm (mm)	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111

• For accessories list see page 97
• For ordering codes see page 132

VISION VX

WITH BUILT-IN CONTROL FUNCTIONS

MODELS MASTER / SLAVE

MASTER Resolution 30 mm	VX 153M	VX 303M	VX 453M	VX 603M	VX 753M	VX 903M	VX 1053M	VX 1203M	VX 1503M
SLAVE Resolution 30 mm	VX 153S	VX 303S	VX 453S	VX 603S	VX 753S	VX 903S	VX 1053S	VX 1203S	VX 1503S
Protected heights mm	160	310	460	610	760	910	1060	1210	1510
Number of beams	8	16	24	32	40	48	56	64	80
Overall height mm *	261	411	561	711	861	1011	1161	1311	1611

MASTER Resolution 40 mm		VX 304M	VX 454M	VX 604M	VX 754M	VX 904M	VX 1054M	VX 1204M	VX 1504M
SLAVE Resolution 40 mm		VX 304S	VX 454S	VX 604S	VX 754S	VX 904S	VX 1054S	VX 1204S	VX 1504S
Protected heights mm		310	460	610	760	910	1060	1210	1510
Number of beams		10	15	20	25	30	35	40	50
Overall height mm *		411	561	711	861	1011	1161	1311	1611

MASTER Resolution 50 mm		VX 305M	VX 455M	VX 605M	VX 755M	VX 905M	VX 1055M	VX 1205M	VX 1505M
SLAVE Resolution 50 mm		VX 305S	VX 455S	VX 605S	VX 755S	VX 905S	VX 1055S	VX 1205S	VX 1505S
Protected heights mm		310	460	610	760	910	1060	1210	1510
Number of beams		8	12	16	20	24	28	32	40
Overall height mm *		411	561	711	861	1011	1161	1311	1611

MASTER 2-3 beams								VX 2BM	VX 3BM
SLAVE 2-3 beams								VX 2BS	VX 3BS
Number of beams								2	3
Distance between beams mm (mm)								500	400
Protected heights mm								510	810
Overall height mm *								711	1011

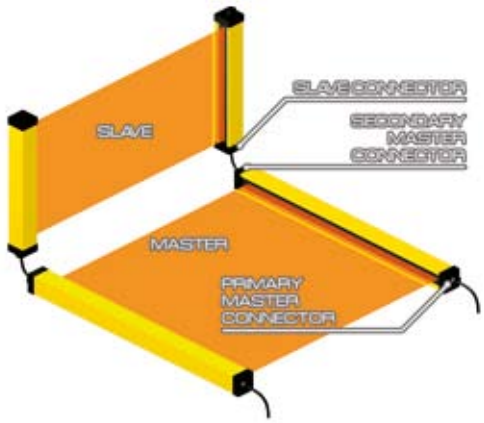
* In the Master models, the total light curtain height is increased by 10 mm due to the presence of the secondary connector.

• For accessories list see page 97
• For ordering codes see page 132

VISION VX

WITH BUILT-IN CONTROL FUNCTIONS

MASTER / SLAVE

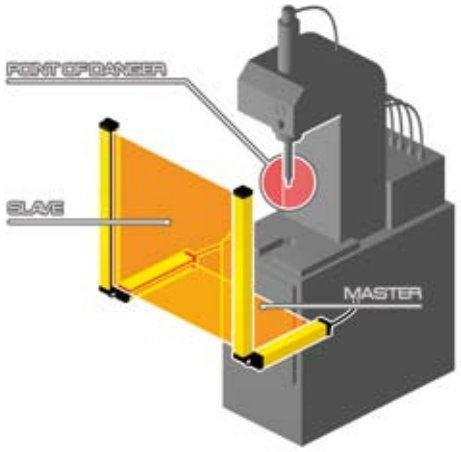


EXAMPLE OF SERIAL CONNECTION BETWEEN MASTER AND SLAVE LIGHT CURTAINS

It is possible to combine any Master model with any Slave model.

All the electrical connections are made using 5-pole M12 connectors, except for the Master receiver, which requires an 8-pole M12 connector.

Accessory cables, pre-wired with 2 connectors, are available for the connection between Master and Slave.

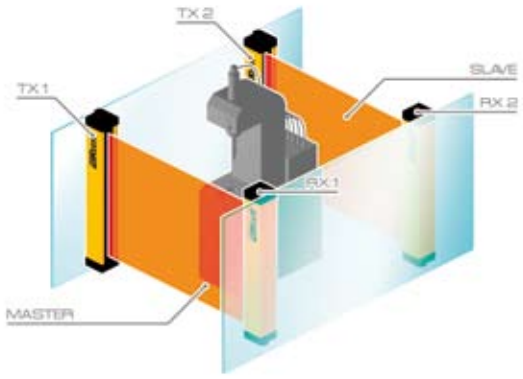


EXAMPLE OF SERIAL CONNECTION BETWEEN MASTER AND SLAVE LIGHT CURTAINS

The Master light curtain is positioned horizontally for detecting the presence of the body while the vertical Slave light curtain carries out hand detection.

However, it is possible to invert the combination and have the Master light curtain positioned vertically for hand protection and the Slave light curtain horizontally for detecting the presence of the body.

The application illustrated is one of the most common types: the horizontal light curtain is used to eliminate the possibility that the operator goes undetected between the vertical light curtain and the dangerous machine at system start or restart.



EXAMPLE OF SERIAL CONNECTION BETWEEN MASTER AND SLAVE LIGHT CURTAINS FOR THE PROTECTION OF 2 SIDES OF THE MACHINE

In the Vision VX light curtains, the length of the connection cable between Master and Slave can be up to 50 metres.

This characteristic enables the application of 2 light curtains in series positioned on the front and back of the dangerous machine, with a single connection towards the power supply and control circuits of the machine.

VISION VXL

WITH BUILT-IN CONTROL FUNCTIONS

MAIN FEATURES

Two self-testing solid state PNP safety outputs.
Periodic auto-test every 28 sec.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).
All connections and configuration by means of M12 connectors.
Use of standard 5-pole and 8-pole cables, up to 100 m long.

TECHNICAL FEATURES

Safety	type 2 with periodic auto-test every 28 sec.
Protected heights mm	160 ÷ 1210
Resolutions mm	30 – 40
Number of beams for body detection in access control	2 - 3 - 4
Max range m	8
Response time ms	4 ÷ 37
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	LEDs for light curtain's status and diagnostic
Restart	automatic or manual ,selectable
External Device Monitoring	feedback input
Power supply Vdc	24 ± 20%
Electrical connections	M12 - 5 poles for emitter M12 - 8 poles for receiver
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Dimensioni sezione (mm)	35 x 45

Safety level: **Type 2**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

VISION VXL

WITH BUILT-IN CONTROL FUNCTIONS

Resolution 30 mm	VXL 153	VXL 303	VXL 453	VXL 603	VXL 753	VXL 903	VXL 1053	VXL 1203
Protected heights mm	160	310	460	610	760	910	1060	1210
Number of beams	8	16	24	32	40	48	56	64
Overall height mm	261	411	561	711	861	1011	1161	1311

Resolution 40 mm	VXL 304	VXL 454	VXL 604	VXL 754	VXL 904	VXL 1054	VXL 1204
Protected heights mm	310	460	610	760	910	1060	1210
Number of beams	10	15	20	25	30	35	40
Overall height mm	411	561	711	861	1011	1161	1311

2-3-4 beams	VXL 2B	VXL 3B	VXL 4B
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111

• For accessories list see page 97
• For ordering codes see page 133

VISION MXL | New

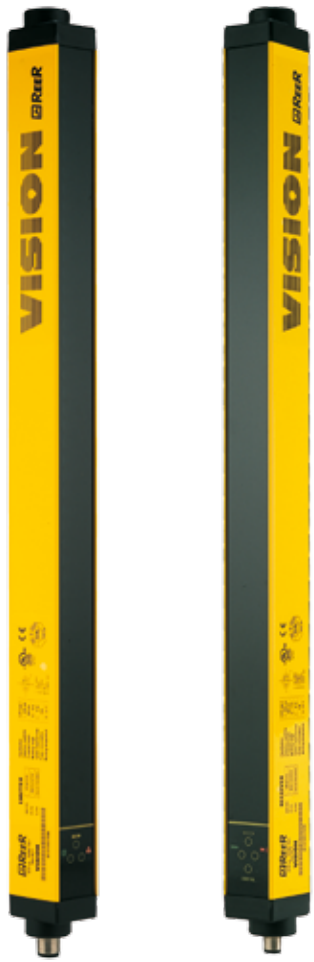
WITH BUILT-IN MUTING AND CONTROL FUNCTIONS

MAIN FEATURES

Muting function with 2 sensors operating logic two-way or one-way built-in in all models.
Built-in **muting timeout** functions; two types of **override**, selectable.
Muting Enable input.
All configuration via hardware by means of **12-pole M16 connectors**.
Use of standard cables up to 100 m long.
Two self-testing solid state PNP safety outputs.
Periodic auto-test every 28 sec.
Built-in start/restart interlock, selectable.
Feedback input for control of external relays (EDM).

TECHNICAL FEATURES

Safety	type 2 with periodic auto-test every 28 sec.
Protected heights mm	160 ÷ 1210
Resolutions mm	30 – 40
Number of beams for body detection in access control	2 - 3 - 4
Max range m	8
Response time ms	4 ÷ 37
Safety outputs	2 PNP auto-controlled – 500 mA at 24 Vdc with short-circuit, overload, polarity reversal protection
Signalling	LEDs for light curtain's and muting sensors status and diagnostic
Restart	automatic or manual, selectable
External Device Monitoring	External device monitoring feedback input with enabling selectable
Muting Sensors	2 inputs for external muting sensors with relay or PNP output 24Vdc (dark-on logic)
Muting logic	- two-way with 2 sensors - one-way with 2 sensors
Max. muting timeout	30 sec., 90 min. or infinite selectable
Override function	Built-in override function with 2 operating modes, selectable: - manual action with hold to run - automatic with pulse command
Max Override Time-out min	15
Muting lamp output	24 Vdc - 0,5÷5 W
Power supply Vdc	24 ± 20%
Electrical connections	M12 - 5 poles for emitter M16 - 12 poles for receiver
Max. cable length m	100
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Fastening modes	3: back slot, side slot or to the top and lower end
Cross section mm	35 x 45



Safety level: **Type 2**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- UL (C + US) mark for USA and Canada
- ANSI / UL 1998 "Safety Software in Programmable Components"

VISION MXL

WITH BUILT-IN MUTING AND CONTROL FUNCTIONS

Resolution 30 mm	MXL 153	MXL 303	MXL 453	MXL 603	MXL 753	MXL 903	MXL 1053	MXL 1203
Protected heights mm	160	310	460	610	760	910	1060	1210
Number of beams	8	16	24	32	40	48	56	64
Overall height mm	261	411	561	711	861	1011	1161	1311

Resolution 40 mm	MXL 304	MXL 454	MXL 604	MXL 754	MXL 904	MXL 1054	MXL 1204
Protected heights mm	310	460	610	760	910	1060	1210
Number of beams	10	15	20	25	30	35	40
Overall height mm	411	561	711	861	1011	1161	1311

2-3-4 beams	MXL 2B	MXL 3B	MXL 4B
Number of beams	2	3	4
Distance between beams mm (mm)	500	400	300
Protected heights mm	510	810	910
Overall height mm	711	1011	1111

• For accessories list see page 97
• For ordering codes see page 133

Two-way muting with 2 sensors

- Two-way muting.
- Max. time between the 2 muting activation signals: 4 sec.
- Possibility to use with photocells, proximity sensors, and limit switches.
- Max. muting timeout time: 30 sec. or infinite, selectable.
- Configuration usable with light curtains with resolution 30, 40 mm with protected height from 310 to 1210 mm and with light curtains with 2, 3, 4 beams.

Characteristics

- Suitable for the most common pallet infeed/outfeed applications.

One-way muting with 2 sensors

- One-way muting for pallet outfeed only.
- Max. time between the 2 muting activation signals: 4 sec.
- Possibility to use with photocells, proximity sensors, and limit switches.
- Max. muting timeout time: 30 sec. or infinite, selectable.
- Configuration usable with light curtains with resolution 30, 40 mm with protected height from 310 to 1210 mm and with light curtains with 2, 3, 4 beams.

Characteristics

- The light curtain only allows pallet outfeed.
- The muting function can only be activated from inside the protected zone. No possibility to activate a muting sequence from the outside.
- Elimination of bulk outside the protected area, as the muting sensors are only present inside the area.
- Correct muting sequence even in the presence of a pallet with reduced width and/or length or not centred with respect to the conveyor.

VISION VX WT

WITH IP 67 WATERTIGHT HOUSING

MAIN FEATURES

The **WT watertight housing** enables the use of Vision VX light curtains in harsh working environments characterised by the presence of water, steam, and low temperatures.
This solution is ideal for applications in the food processing industry and in washing systems, including those under pressure.

Models are available for protecting light curtains with protected height from 160 to 1810 mm.

TECHNICAL FEATURES

All the main technical features are the same of VISION VX

Protection rating	IP 67
Operating temperature °C	0 ÷ 55
Max water pressure (jets)	40 bar (with temperature from 10° to 40°)
Max range m	5 – 15 selectable
Available Resolution mm	30
Number of beams for body detection in access control	2 – 3 - 4
Light curtain electrical connections	cable 10 metres pre-wired with cable gland
Fastening	by means of set of 4 WFB ring brackets (included)
Dimensions mm	Total light curtain height + 124 x 75 Ø

MODELS

Resolution 30 mm	VX 153 WT	VX 303 WT	VX 453 WT	VX 603 WT	VX 753 WT	VX 903 WT	VX 1053 WT	VX 1203 WT	VX 1353 WT	VX 1503 WT	VX 1653 WT	VX 1803 WT
Protected heights mm	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
Number of beams	8	16	24	32	40	48	56	64	72	80	88	96
Overall height mm	375	525	675	825	975	1125	1275	1425	1575	1725	1875	2025

2-3-4 beams	VX 2B WT	VX 3B WT	VX 4B WT
Number of beams	2	3	4
Distance between beams mm	500	400	300
Protected heights mm	510	810	910
Overall height mm	825	1125	1225

- The light curtains are supplied already housed in the WT watertight housings.
- Cables and ring brackets are included in the kit.

Please contact Reer preventively to assess adequacy to your application.

VISION

ORDERING INFORMATION (for ordering codes see page 131)

Each Vision light curtain comprises:

- Emitter and Receiver pair
- Mounting brackets and T-nuts
- CD-ROM containing the multi-language instruction manual complete with CE declaration of conformity

ACCESSORIES

For Vision light curtains the following accessories, to be ordered separately, are available:

• AD SR Safety Relays	see page 105
• LAD laser alignment device	see page 124
• FMC floor mounting columns	see page 120
• SP deflection mirrors	see page 122
• SFB swivel fixing brackets	see page 125
• SAV vibrations dampers	see page 125
• Connectors	see below:

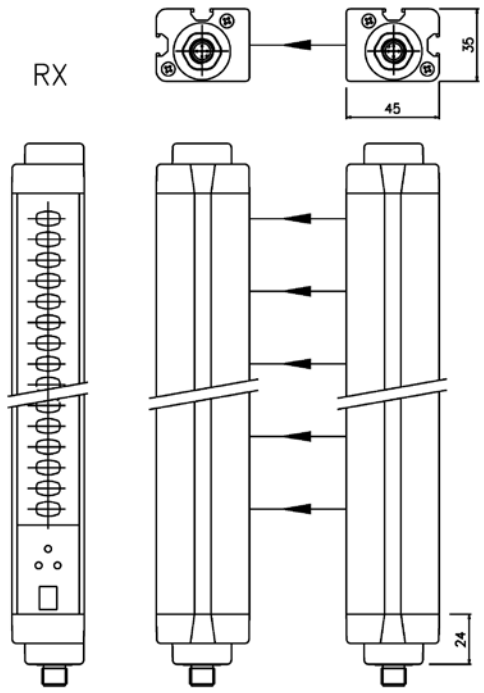
Model	Description
Connectors for Vision V emitter and receiver / VX – VXL - MXL emitter	
CD 5	M12, straight connector, 5 poles, pre-wired cable 5 m
CD 10	M12, straight connector, 5 poles, pre-wired cable 10 m
CD 15	M12, straight connector, 5 poles, pre-wired cable 15 m
CD 20	M12, straight connector, 5 poles, pre-wired cable 20 m
CD 95	M12, 90° angle connector, 5 poles, pre-wired cable 5 m
CD 910	M12, 90° angle connector, 5 poles, pre-wired cable 10 m
CD 915	M12, 90° angle connector, 5 poles, pre-wired cable 15 m
CDM 9	M12, straight connector, 5 poles with screw terminal, PG9 cable gland
CDM 99	M12, angle connector, 5 poles with screw terminal, PG9 cable gland
Connectors for Vision / VX – VXL - receiver	
C8D 5	M12, straight connector, 8 poles, pre-wired cable 5 m
C8D 10	M12, straight connector, 8 poles, pre-wired cable 10 m
C8D 15	M12, straight connector, 8 poles, pre-wired cable 15 m
C8D 95	M12, 90° angle connector, 8 poles, pre-wired cable 5 m
C8D 910	M12, 90° angle connector, 8 poles, pre-wired cable 10 m
C8D 915	M12, 90° angle connector, 8 poles, pre-wired cable 15 m
C8DM 9	M12, straight connector, 8 poles with screw terminal, PG9 cable gland
C8DM 99	M12, angle connector, 8 poles with screw terminal, PG9 cable gland
C8DM 11 | **new**	M12, straight connector, 8 poles with screw terminal, PG9/11 cable gland
C8DM 911 | **new**	M12, angle connector, 8 poles with screw terminal, PG9/11 cable gland
Connectors for Vision MXL - receiver	
C12D 3	M16, straight connector, 12 poles, pre-wired cable 3 m
C12D 5	M16, straight connector, 12 poles, pre-wired cable 5 m
C12D 10	M16, straight connector, 12 poles, pre-wired cable 10 m
Connection between master and slave	
CDS 03	0.3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 3	3 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 5	5 m pre-wired cable with 2 straight connectors, M12, 5 poles
CJBE 10	10 m pre-wired cable with 2 straight connectors, M12, 5 poles

The Vision VX WT models are already supplied with 10 metres pre-wired cables and ring brakets

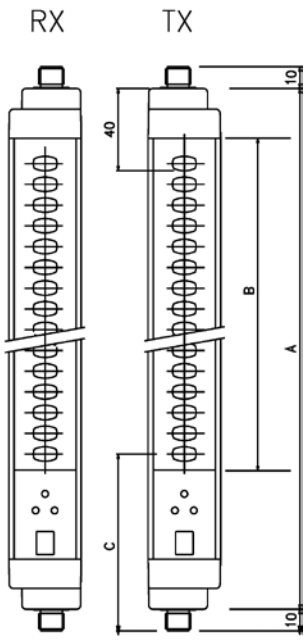
VISION

DIMENSIONS mm

STANDARD AND SLAVE MODELS



MASTER MODELS



Model	150	300	450	600	750	900	1050	1200	1350	1500	1650	1800
A	251	401	551	701	851	1001	1151	1301	1451	1601	1751	1901
B (protected height)	160	310	460	610	760	910	1060	1210	1360	1510	1660	1810
C (1st beam position)	85											
Mounting	2 LS type brackets with 2 inserts							3 LS type brackets with 3 inserts				

Model	2B	3B	4B
A	701	1001	1101
B	510	810	910
C (1st beam position)	135		
Mounting	2 LS type brackets with 2 inserts		

WARNING !

- When the light curtain works in the presence of strong vibrations (presses, weaving machines etc.), in order to avoid damages to the light curtain it is necessary to use the anti-vibration dampers SAV (available as accessories).
- When long range protections or perimeter protections employing mirrors have to be realised it is advisable to use the LAD laser pointer as an alignment aid, as well as the adjustable swivel brackets SWB.

ILION

ULISSE

ILION

MAIN FEATURES

ILION is a Type 2 safety photocell with M18 cylindrical **metal body**. The protection system can be composed of 1, 2, 3 or 4 single beam photocells connected to an AU SX standard or AU SXM control unit **with muting** (for details on the interface see AU SX and AU SXM control units).

The compact size of the photocells makes it possible to fit the protection system into very small spaces, while the possibility to use more photocells provides the maximum flexibility in positioning the protective beams.

Safety level: **Type 2**
(with AUS X or AUS XM control unit).
Complying with:
- 98/37/EEC “Machine Directive”.
- 89/336/EEC “Electromagnetic Compatibility Directive”.
- 73/23/EEC “Low Voltage Directive”.
- EN 61496-1 and IEC 61496-1-2 “Electrosensitive protection devices”.

PHOTOELECTRIC SENSOR TECHNICAL DATA

Model	IL 10	IL 20
Safety	type 2 with control unit AUS X or AUS XM	type 2 with control unit AUS X or AUS XM
Minimum detectable object mm	12	12
Max range m	8	20
Number of photocells per control unit	from 1 to 4	from 1 to 4
Response time for each photocell ms	7	7
Output	2 PNP – 100 mA	2 PNP – 100 mA
Signalling	led status	led status
Power supply Vdc	24 ± 20%	24 ± 20%
Electrical connections	M12 - 4 poles for emitter and receiver	M12 - 4 poles for emitter and receiver
Max. cable length m	50 (between sensor and control unit)	50 (between sensor and control unit)
Operating temperature °C	0 ÷ 55	0 ÷ 55
Protection rating	IP 67	IP 67
Dimensions mm	Ø 18 x 85	Ø 18 x 85

ILION

ORDERING INFORMATION (for ordering codes see page 133)

Each Ilion photocell includes:

- Emitter and Receiver pair
- Multi-language instruction manual complete with CE declaration of conformity

ACCESSORIES

The following connectors are available for the Ilion photocells, to be ordered separately:

Connectors for Ilion emitter and receiver

Model	Description
CD 5	M12, straight connector, 5 poles, pre-wired cable 5 m
CD 10	M12, straight connector, 5 poles, pre-wired cable 10 m
CD 15	M12, straight connector, 5 poles, pre-wired cable 15 m
CD 20	M12, straight connector, 5 poles, pre-wired cable 20 m
CD 95	M12, 90° angle connector, 5 poles, pre-wired cable 5 m
CD 910	M12, 90° angle connector, 5 poles, pre-wired cable 10 m
CDM 915	M12, 90° angle connector, 5 poles, pre-wired cable 15 m
CDM 9	M12, straight connector, 5 poles with screw terminal, PG9 cable gland
CDM 99	M12, angle connector, 5 poles with screw terminal, PG9 cable gland

ADJUSTABLE FIXING BRACKET

Model	Description
IL FB	Set of 2 brackets

The IL FB bracket permits both vertical and horizontal adjustment of the optical axis of the photocell.

ULISSE

MAIN FEATURES

ULISSE is a Type 2 safety photocell with **metal body** and 3-pole M8 connector.
The protection system can be composed of 1, 2, 3 or 4 single beam photocells connected to an AUS X standard or AUS XM control unit **with muting** (for details on the interface see AUS X and AUS XM control units).

Thanks to the very small size, the container in anodised aluminium and the **glass lenses** free from electrostatic dust attraction, ULISSE is the ideal solution for the protection of **weaving machines** as well as of other applications characterised by high levels of mechanical stress or very restricted spaces.

CE TÜV PRODUCT SERVICE Sicherheit in der Elektronik nach DIN / VDE und EN / IEC Normen

Safety level: **Type 2**
(with AUS X or AUS XM control unit).
Complying with:
- 98/37/EEC “Machine Directive”.
- 89/336/EEC “Electromagnetic Compatibility Directive”.
- 73/23/EEC “Low Voltage Directive”.
- EN 61496-1 and IEC 61496-1-2 “Electrosensitive protection devices”.

PHOTOELECTRIC SENSOR TECHNICAL DATA

Model	**UPC**
Safety	type 2 with control unit AUS X or AUS XM
Minimum detectable object mm	8
Max range m	6
Number of photocells per control unit	from 1 to 4
Response time for each photocell ms	7
Output	PNP 100 mA
Signalling	led status
Power supply Vdc	24 ± 20%
Electrical connections	M8 - 3 poles for emitter and receiver
Max. cable length m	50 (between sensor and control unit)
Operating temperature °C	0 ÷ 55
Protection rating	IP 65
Dimensions (h x w x d) mm	58 x 15 x 25

ULISSE

ORDERING INFORMATION (for ordering codes see page 133)

Each Ulisse photocell includes:

- Emitter and Receiver pair
- Multi-language instruction manual complete with CE declaration of conformity

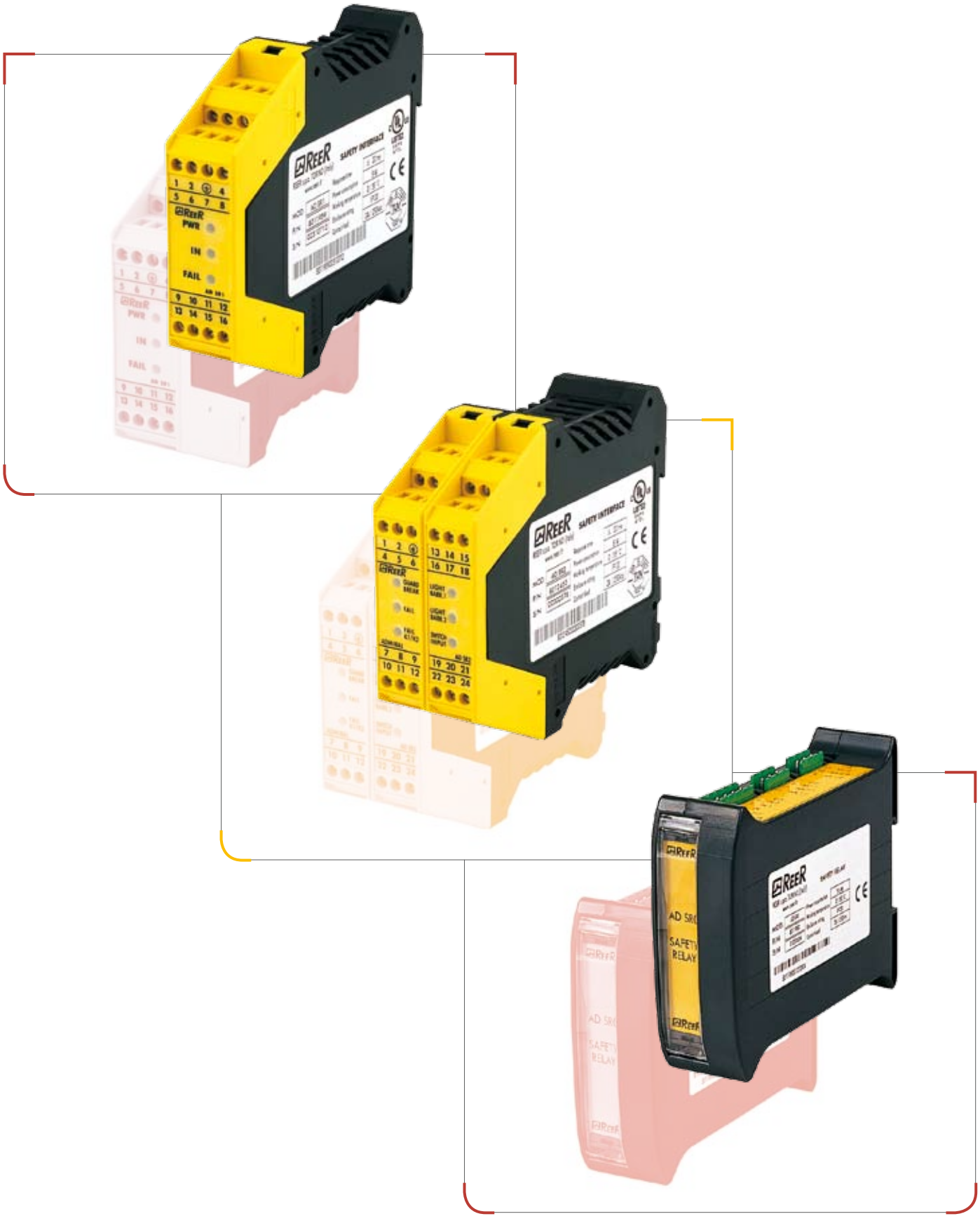
ACCESSORIES

he following connectors are available for the Ulisse photocells, to be ordered separately:

Connectors for Ulisse emitter and receiver

Model	Description
C 85	M8 straight connector, 3 poles, pre-wired cable 5 m
C 815	M8 straight connector, 3 poles, pre-wired cable 15 m
C 895	M8 90° angle connector, 3 poles, pre-wired cable 5 m

SAFETY INTERFACES



AD SR1

MAIN FEATURES

The AD SR1 safety interface is the dedicated interface system between the **Admiral AD**, **Admiral AX BK** and **Vision V** safety light curtains, equipped with solid state self-controlled safety outputs, and the control circuits of the machine.
AD SR1 also makes it possible to have auxiliary safety functions such as **Start/ Restart interlock** and **EDM** (control of the final switching devices).

Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- EN 954-1 "Elements of safety-related control systems"
- UL (C + US) mark for USA and Canada

TECHNICAL FEATURES

Model	**AD SR1**
Safety	Type 4
Two-channel inputs for safety light curtains	1
Safety relay outputs	2 NO - 2 A 250 Vac
Safety system status indicator output	PNP – 100 mA at 24 Vdc
Response time ms	≤ 20
Restart	manual or automatic restart selectable on terminal block
External Device Monitoring	external relay control feedback input, selectable
Signalling	LED indication of input/output status and diagnosis
Power supply Vdc	24 ± 20%
Electrical connections	on terminal block
Operating temperature °C	0 ÷ 55
Protection rating	IP 20 for housing IP 2X for terminal block
Fastening	rail fastening according to EN 50022-35 standard
Dimensions (h x w x d) mm	99 x 22,5 x 114

ORDERING INFORMATION (for ordering codes see page 133)

Each AD SR1 safety interface includes:

• Multi-language instruction manual complete with CE declaration of conformity

AD SRM

MAIN FEATURES

The AD SRM safety interface with built-in **muting** function can be combined with the Admiral, Vision, and Janus safety light curtains of any resolution and protected height, as well as with the Pharo safety laser scanner.
AD SRM operates with **2 muting sensors** with simultaneity logic and is equipped with selectable Muting Timeout, **Override** function (with timeout), Muting Enable input, system status signalling output, and all the characteristics necessary for realising muting protection in compliance with the **most updated regulatory requirements**.
AD SRM also makes it possible to have **auxiliary safety functions** such as Start/Restart interlock and EDM (control of the final switching devices).

Safety level: **Type 4**.
Complying with:
- 98/37/EEC "Machine Directive".
- 89/336/EEC "Electromagnetic Compatibility Directive".
- 73/23/EEC "Low Voltage Directive".
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices".
- EN 954-1 "Elements of safety-related control systems".
- UL (C + US) mark for USA and Canada.

TECHNICAL FEATURES

Model	**AD SRM**
Safety	Type 4
Two-channel inputs for safety light curtains	1
Safety relay outputs	2 NO - 2 A 250 Vac
Safety system status indicator output	PNP – 100 mA at 24 Vdc
Response time ms	≤ 20
Restart	manual or automatic restart selectable on terminal block
External Device Monitoring	external relay control feedback input, selectable
Muting Sensors Inputs	2 inputs for external muting sensors with relay or PNP output 24Vdc (dark-on logic)
Muting Enable input	Active High - 24 Vdc
Muting lamp output	24 Vdc - 0.5-5 W
Muting timeout	30 sec. or infinite, selectable
Override	2 operating modes selectable : - manual action with hold to run - automatic with pulse command
Override timeout min	15
Signalling	LED indications of input/output status, muting sensor inputs, diagnosis
Power supply Vdc	24 ± 20%
Electrical connections	On terminal block
Operating temperature °C	0 ÷ 55
Protection rating	IP 20 for housing - IP 2X for terminal block
fastening	rail fastening according to EN 50022-35 standard
Dimensions (h x w x d) mm	99 x 35 x 114

ORDERING INFORMATION (for ordering codes see page 133)

Each AD SRM safety interface includes:

• Multi-language instruction manual complete with CE declaration of conformity

AU SX

MAIN FEATURES

The AU SX control unit, combined with the safety photocells of the **Ilion** or **Ulisse** series, is a Type 2 optoelectronic safety system that can include from 1 to 4 photocells.

AU SX is equipped with **relay** outputs and makes it possible to have auxiliary safety functions such as **Start/Restart interlock** - with control of the Re-start contact - and **EDM** (control of the final switching devices).

Safety level: **Type 2**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- EN 954-1 "Elements of safety-related control systems"
- UL (C + US) mark for USA and Canada

TECHNICAL FEATURES

Model	AU SX
Safety	Type 2
Number of photocells	1 ÷ 4
Safety relay outputs	2 NO - 2 A 250 Vac
Safety system status indicator output	PNP – 100 mA at 24 Vdc
Response time ms	≤ 30
Restart	manual or automatic restart selectable on terminal block
External Device Monitoring	external relay control feedback input, selectable
Signalling	LED indication of input/output status and diagnosis
Power supply Vdc	24 ± 20%
Electrical connections	on terminal block
Operating temperature °C	0 ÷ 55
Protection rating	IP 20 for housing - IP 2X for terminal block
fastening	rail fastening according to EN 50022-35 standard
Dimensions (h x w x d) mm	99 x 22,5 x 114

ORDERING INFORMATION (for ordering codes see page 133)

Each AUS X safety control unit includes:

• Multi-language instruction manual complete with CE declaration of conformity

AU SXM

MAIN FEATURES

The AUS XM control unit with built-in **muting function**, combined with the safety photocells of the **Ilion** or **Ulisse** series, is a Type 2 optoelectronic safety system that can include from 1 to 4 photocells.
AU SXM operates with **2 muting sensors** with simultaneity logic and is equipped with selectable Muting Timeout, **Override** function (with timeout), Muting Enable input, system status signalling output, and all the characteristics necessary for realising muting protection in compliance with the **most updated regulatory requirements**.
AU SXM, equipped with relay outputs, also makes it possible to have **auxiliary safety functions** such as Start/Restart interlock - with control of the Restart contact - and EDM (control of the final switching devices).

Safety level: **Type 2**.
Complying with:
- 98/37/EEC "Machine Directive"
- 89/336/EEC "Electromagnetic Compatibility Directive"
- 73/23/EEC "Low Voltage Directive"
- EN 61496-1 and IEC 61496-1-2 "Electrosensitive protection devices"
- EN 954-1 "Elements of safety-related control systems"
- UL (C + US) mark for USA and Canada.

TECHNICAL FEATURES

Model	AU SXM
Safety	Type 2
Number of photocells	1 ÷ 4
Safety relay outputs	2 NO - 2 A 250 Vac
Safety system status indicator output	PNP – 100 mA at 24 Vdc
Response time ms	≤ 30
Restart	manual or automatic restart selectable on terminal block
External Device Monitoring	external relay control feedback input, selectable
Muting Sensors Inputs	2 inputs for external muting sensors with relay or PNP output 24Vdc (dark-on logic)
Muting Enable input	Active High - 24 Vdc
Muting lamp output	24 Vdc - 0.5-5 W
Muting timeout	30 sec. or infinite, selectable
Override	2 operating modes selectable : - manual action with hold to run - automatic with pulse command
Override timeout min	15
Signalling	LED indications of input/output status, muting sensor inputs, diagnosis
Power supply Vdc	24 ± 20%
Electrical connections	on terminal block
Operating temperature °C	0 ÷ 55
Protection rating	IP 20 for housing - IP 2X for terminal block
fastening	rail fastening according to EN 50022-35 standard
Dimensions (h x w x d) mm	99 x 35 x 114

ORDERING INFORMATION (for ordering codes see page 133)

Each AUS XM safety interface includes:

• Multi-language instruction manual complete with CE declaration of conformity

AD SR0 / AD SR0A

MAIN FEATURES

The AD SR0 and AD SR0A relay modules have been especially designed for **interfacing the Admiral AX**, **Vision VX/VXL/MXL**, **Janus** safety light curtains and the **Pharo** safety laser scanner, equipped with feedback input for controlling external relays, with the control circuits of the machine.

The module operates with **2 relays with guided contacts for safety applications**, driven and monitored directly by the safety sensor.

CE

TECHNICAL FEATURES

Model	AD SR0	AD SR0A
Safety relay outputs	2 NO + 1 NC- 2 A 250 Vac *	2 NO - 2 A 250 Vac
EDM	2 NC - 2 A 250 Vac series contacts dedicated to relay monitoring made by the safety sensor	
Response time ms	≤ 20	
Power supply Vdc	24 ± 20%	
Electrical connections	on terminal block	
Operating temperature °C	0 ÷ 55	
Protection rating	IP 20 for housing - IP 2X for terminal block	
Mounting	rail fastening according to EN 50022-35 standard	
Dimensions (h x w x d) mm	101 x 35 x 120	

** In AD SR0 safety relay each NO safety output line is interrupted twice by the two relays*

ORDERING INFORMATION (for ordering codes see page 133)

Each AD SR0 and AD SR0A safety relay includes:

- Multi-language instruction manual complete with CE declaration of conformity.

WARNING !

The AD SR0 and AD SR0A modules can only be connected to safety sensors equipped with feedback input for monitoring external relays (EDM); that is, the models of the Janus, Admiral AX (excluding the AX BK models with Blanking), Pharo and Vision VX, VXL and MXL ranges.

Please contact Reer for any other type of application.

METRON

Lens pitch
Number of beams
Working range
Measuring time
Power consumption
Working temperature
MOD.
MER 752 B
P/N
80015711
S/N
06160120
REER
METRON
IN

METRON

MAIN FEATURES

Light curtains for industrial and civil applications where it is necessary to detect, measure, and recognise objects.
Depending on the number and position of the beams engaged by an object, **METRON** can provide real time information to a PLC or PC useful to:

- **Detect the presence or absence of objects**
- **Perform a count**
- **Detect a position**
- **Detect a shape or a profile**
- **Measure dimensions**

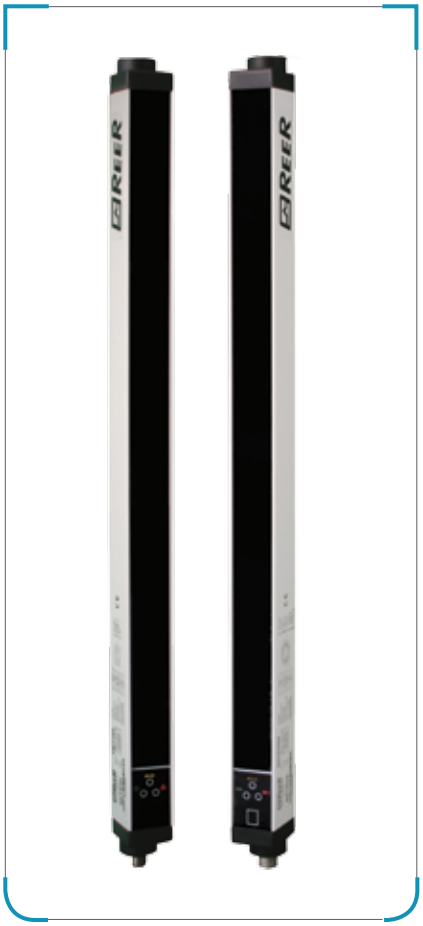
Models A equipped with 4 programmable solid state outputs.
Models B equipped with 2 programmable solid state outputs and an RS 485 serial interface.
Models C equipped with two antivalent solid state outputs for "status of controlled area".

Metronconf Configuration software for PC, with practical **graphic interface**, supplied with each light curtain (models A and B only).

Beam spacing available from 5 mm to 75 mm.
Protected height from 140 mm to 2525 mm.
Max. range 16 m (10 mm and 30 mm models).

Connections with M12 and M16 connectors. Up to 50 m of electrical connections without shieldied cables.

Possibility of connection of up to 8 Metron B light curtains as nodes of an RS 485 serial line for simultaneous detection of multiple dimensions and complex measurements.



CE

THE METRON RANGE

METRON A

4 solid state outputs 0/24V with programmable functions
Solution providing simple on/off information related to the occurrence of the programmed conditions
Ideal for object recognition, quality control, detection of dimensional limits

METRON B

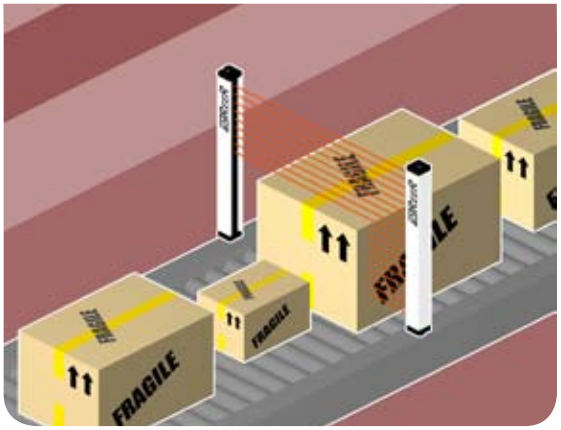
RS-485 serial line + two solid state outputs 0/24V with programmable functions
Solution providing complete and detailed information on the status of each beam via the RS 485 serial line and, by means of the two solid state outputs, further on/off information related to the occurrence of the programmed conditions
Ideal for dimensional measurement, detection of object profile and position

METRON C

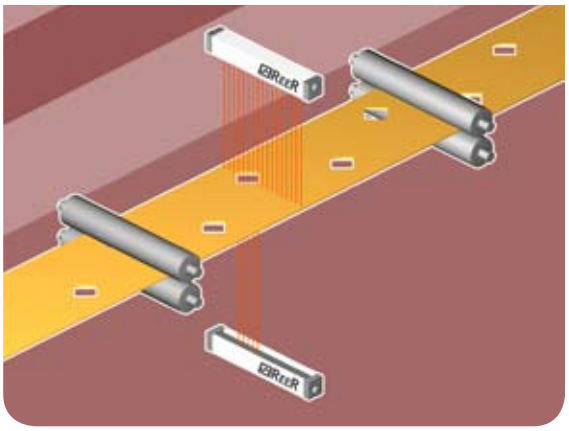
Two solid state antivalent outputs 0/24V without the need for programming
Solution providing simple on/off information related to the status of the controlled area
Ideal for piece counting and detection of object presence/absence in the controlled field

METRON

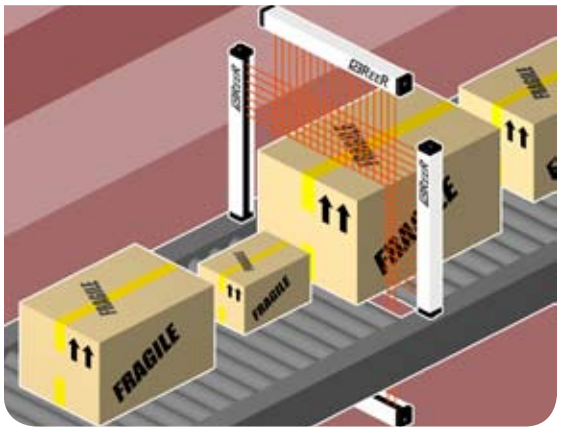
APPLICATION EXAMPLES



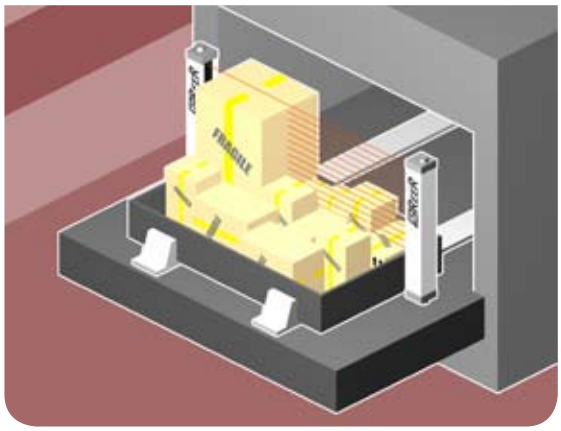
Measurement of the height of objects in transit on conveyor systems



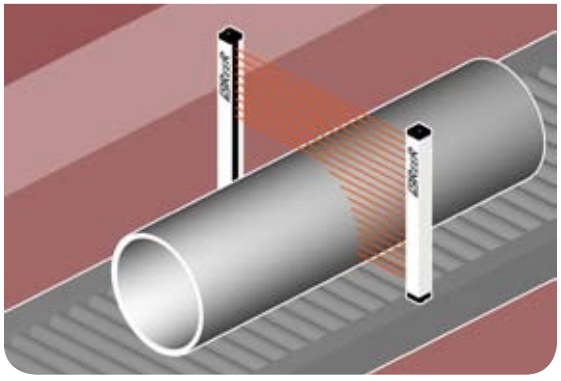
Quality control: verification of presence / absence / position of holes



Two-dimensional detection of objects in transit on conveyor systems with use of 2 light curtains. If necessary, the calculation of the volume can be made by means of a third horizontal light curtain, or considering the transit speed



Automatic warehouses: detection of maximum height of the objects present in the boxes for efficient management of the machine's capacity

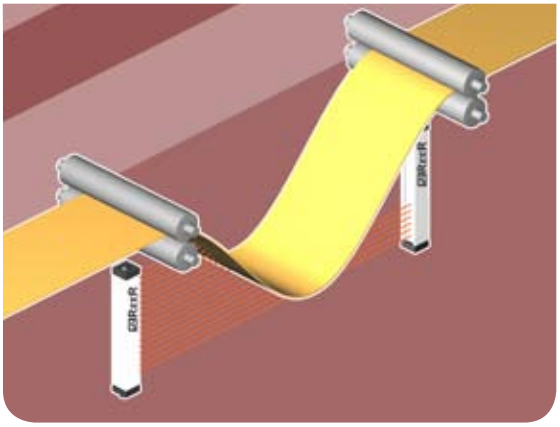


Measurement and identification of cylinders of various sizes

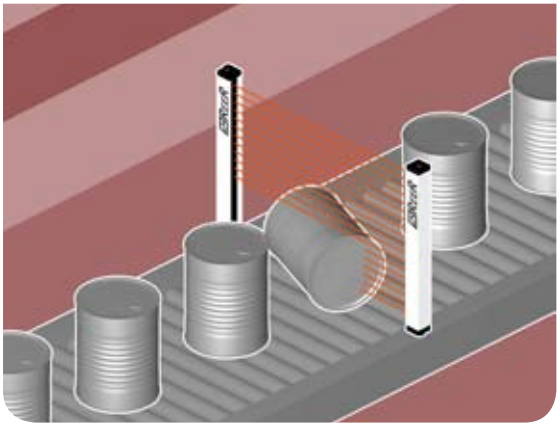
Detection of position and profile of pieces in automatic painting systems

METRON

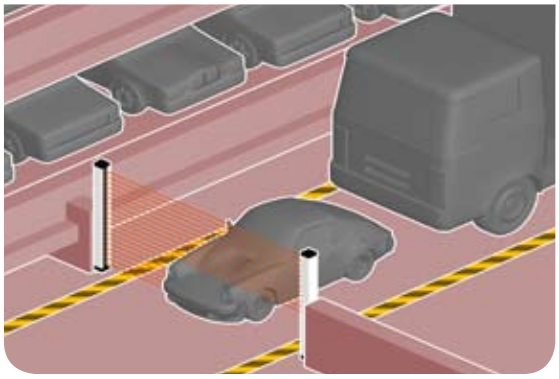
APPLICATION EXAMPLES



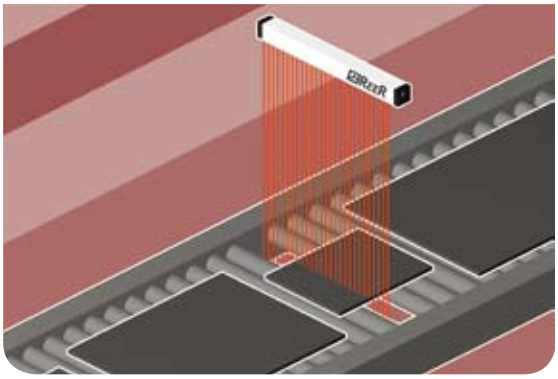
Loop control



Quality control: verification of correct positioning of objects



Detection of overall dimensional limits of vehicles for vehicle handling in automatic parking garages



Measurement of the width and position of panels or sheets of material in transit on roller units or conveyor belts

Special customised models available on request.

Special models in conformity with the “ATEX Directive” 94/9/CEE – Dust Zone 22 - Gas Zone 2 available on request.

METRON

TECHNICAL FEATURES

Controlled heights mm		140 ÷ 2525
Beam spacing mm		5 - 10 - 25 - 30 - 50 - 75
Max range m		2 – for models with beam spacing 5 mm 6 - for models with beam spacing 25 - 50 - 75 mm 16 - for models with beam spacing 10 - 30 mm
Measurement time		(2.25 ms + 70 µs x n beams) x 2
Outputs	Metron A	4 - solid state 0 / 24V programmable - PNP 100 mA at 24Vdc
	Metron B	RS-485 Serial line (up to 8 nodes) 2 - solid state 0 / 24V programmable - PNP 100 mA at 24Vdc
	Metron C	2 - solid state 0 / 24V antivalent - PNP 100 mA at 24Vdc
Inputs (on receiver) (Metron A and B only)		1 - digital with programmable functions - 0/24V
Metron A and B programming		via Metronconf configuration software
Metron A and B programming interface		RS-232 serial line
Synchronisation between emitter and receiver		Optical or via cable, selectable
Electrical connections	Metron A and B	1 connector M12 8-pole (emitter) 1 main connector M16 12-pole (receiver) 1 secondary connector M8 3-pole for RS-232 line for programming (receiver)
	Metron C	Metron C 2 M12 5-pole connectors (emitter and receiver)
Signalling		7-segment display and LEDs for operating status and light curtain self-diagnosis
Power supply Vdc		24 ± 20%
Max. length connection cables between light curtain and interface m		50
Operating temperature °C		0 ÷ 55
Protection rating		IP 65
Fastening mode		3: back slot, side slot, or to the top and lower end
Cross-section dimensions mm		35 x 45

CHARACTERISTICS OF METRONCONF CONFIGURATION SOFTWARE

Possibility for on-line display on PC screen during operation (via RS 232)	Status of each individual beam and solid state outputs
Configurable parameters	Operating logic (conditions for output activation), parameters of the RS-485 serial line (transmission method, baud rate, parity, start-stop characters, binary, hex, ascii format, etc.)

METRON

MODELS

Beam spacing 5 mm	ME 150	ME 300	ME 450	ME 600	ME 750	ME 900	ME 1050	ME 1200	-	-	-	-	-	-	-	-	-
Controlled heights mm	145	295	445	595	745	895	1045	1195	-	-	-	-	-	-	-	-	-
Number of beams	30	60	90	120	150	180	210	240	-	-	-	-	-	-	-	-	-
Overall height mm	261	411	561	711	861	1011	1161	1311	-	-	-	-	-	-	-	-	-

Beam spacing 10 mm	ME 151	ME 301	ME 451	ME 601	ME 751	ME 901	ME 1051	ME 1201	ME 1351	ME 1501	ME 1651	ME 1801	ME 1951	ME 2101	ME 2251	ME 2401	-
Controlled heights mm	140	290	440	590	740	890	1040	1190	1340	1490	1640	1790	1940	2090	2240	2390	-
Number of beams	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	-
Overall height mm	261	411	561	711	861	1011	1161	1311	1461	1611	1761	1911	2061	2211	2361	2511	-

Beam spacing 25 mm	-	ME 302	ME 452	ME 602	ME 752	ME 902	ME 1052	ME 1202	ME 1352	ME 1502	ME 1652	ME 1802	ME 1952	ME 2102	ME 2252	ME 2402	ME 2552
Controlled heights mm	-	275	425	575	725	875	1025	1175	1325	1475	1625	1775	1925	2075	2225	2375	2525
Number of beams	-	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102
Overall height mm	-	411	561	711	861	1011	1161	1311	1461	1611	1761	1911	2061	2211	2361	2511	2661

Beam spacing 30 mm	-	ME 303	ME 453	ME 603	ME 753	ME 903	ME 1053	ME 1203	ME 1353	ME 1503	ME 1653	ME 1803	ME 1953	ME 2103	ME 2253	ME 2403	ME 2553
Controlled heights mm	-	270	420	570	720	870	1020	1170	1320	1470	1620	1770	1920	2070	2220	2370	2520
Number of beams	-	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85
Overall height mm	-	411	561	711	861	1011	1161	1311	1461	1611	1761	1911	2061	2211	2361	2511	2661

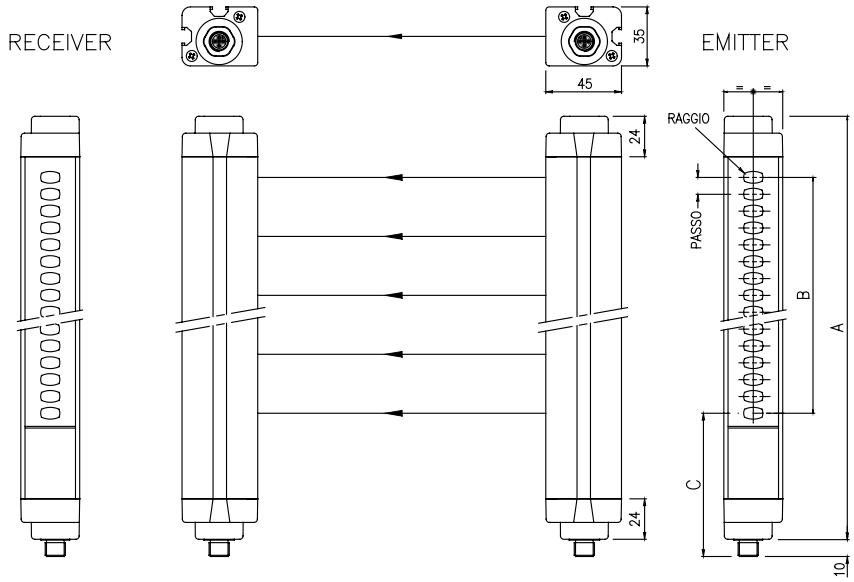
Beam spacing 50 mm	-	-	ME 455	ME 605	ME 755	ME 905	ME 1055	ME 1205	ME 1355	ME 1505	ME 1655	ME 1805	ME 1955	ME 2105	ME 2255	ME 2405	ME 2555
Controlled heights mm	-	-	400	550	700	850	1000	1150	1300	1450	1600	1750	1900	2050	2200	2350	2500
Number of beams	-	-	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51
Overall height mm	-	-	561	711	861	1011	1161	1311	1461	1611	1761	1911	2061	2211	2361	2511	2661

DBeam spacing 75 mm	-	-	-	ME 607	ME 757	ME 907	ME 1057	ME 1207	ME 1357	ME 1507	ME 1657	ME 1807	ME 1957	ME 2107	ME 2257	ME 2407	ME 2557
Controlled heights mm	-	-	-	525	675	825	975	1125	1275	1425	1575	1725	1875	2025	2175	2325	2475
Number of beams	-	-	-	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Overall height mm	-	-	-	711	861	1011	1161	1311	1461	1611	1761	1911	2061	2211	2361	2511	2661

• For accessories list see page 118
• For ordering codes see page 133

METRON

DIMENSIONS mm



Model ME	150	300	450	600	750	900	1050	1200
A	251	401	551	701	851	1001	1151	1301
B (controlled height)	B = (number of beams -1) x beam spacing (with cable synchronisation) B = (number of beams -2) x beam spacing (with optical synchronisation)*							
C (1st beam position)	85 (for 10 - 30 models) - 93 (for 25–50-75 models)							
Mounting	2 LS type brackets with 2 inserts							

Model ME	1350	1500	1650	1800	1950	2100	2250	2400	2550
A	1451	1601	1751	1901	2051	2201	2351	2501	2651
B (controlled height)	B = (number of beams -1) x beam spacing (with cable synchronisation) B = (number of beams -2) x beam spacing (with optical synchronisation)*								
C (1st beam position)	85 (for 10 - 30 models) - 93 (for 25–50-75 models)								
Mounting	3 LS type brackets with 3 inserts								

** In the case of optical synchronism, the beam adjacent to the upper end cap cannot be used for measurement, as it constitutes the synchronism beam.*

ORDERING INFORMATION (for ordering codes see page 133)

In addition to the height and beam spacing, to uniquely define a Metron light curtain the model must also be indicated A, B or C:

Models A	4 outputs with programmable functions (e.g.: ME 1801 A)
Models B	RS-485 serial line + 2 solid state outputs 0/24V with programmable functions (e.g.: ME 1801 B)
Models C	2 solid state outputs 0/24V antivalent (without the need for programming) (e.g.: ME 1801 C)
Each type of Metron light curtain includes:	• Emitter and Receiver pair • Mounting brackets and T-nuts • CD-ROM containing the “Metronconf” programming software and the multi-language instruction manual

METRON

ACCESSORIES

For Metron light curtains the following accessories, to be ordered separately, are available:

• LAD laser alignment device	see page 124
• FMC floor mounting columns	see page 120
• SP deflection mirrors	see page 122
• SFB swivel fixing brackets	see page 125
• SAV vibrations dampers	see page 125
• Connectors	see below:

Connectors for Metron "A" and "B" emitter

Model	Description
C8D 5	M12, straight connector, 8 poles, pre-wired cable 5 m
C8D 10	M12, straight connector, 8 poles, pre-wired cable 10 m
C8D 15	M12, straight connector, 8 poles, pre-wired cable 15 m
C8D 95	M12, 90° angle connector, 8 poles, pre-wired cable 5 m
C8D 910	M12, 90° angle connector, 8 poles, pre-wired cable 10 m
C8D 915	M12, 90° angle connector, 8 poles, pre-wired cable 15 m
C8DM 9	M12, straight connector, 8 poles with screw terminal, PG9 cable gland
C8DM 99	M12, angle connector, 8 poles with screw terminal, PG9 cable gland
C8DM 11 | new	M12, straight connector, 8 poles with screw terminal, PG9/11 cable gland
C8DM 911 | new	M12, angle connector, 8 poles with screw terminal, PG9/11 cable gland

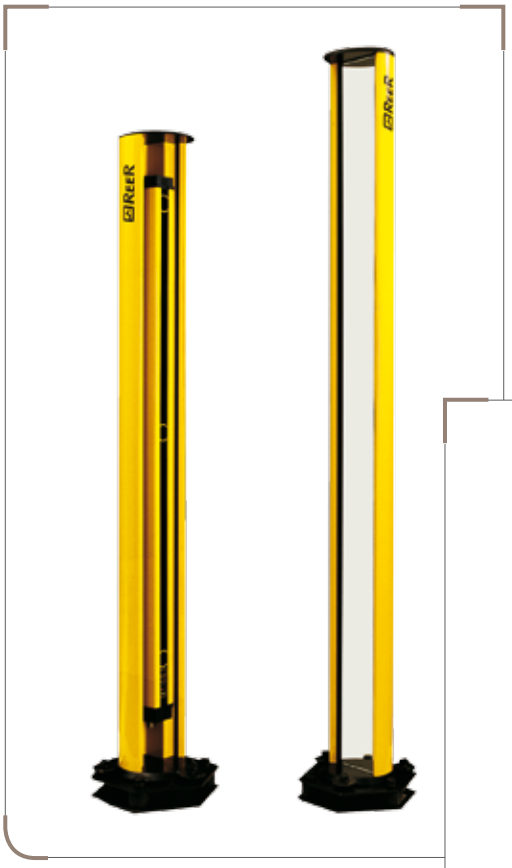
Connectors for Metron "A" and "B" receiver

Model	Description
C12D 3	M16, straight connector, 12 poles, pre-wired cable 3 m
C12D 5	M16, straight connector, 12 poles, pre-wired cable 5 m
C12D 10	M16, straight connector, 12 poles, pre-wired cable 10 m
CSL 3	3 metre cable, for connecting light curtain and PC for system configuration, equipped with one M8, 3 poles connector and one DB9 connector

Connectors for Metron "C" emitter and receiver

Model	Description
CD 5	M12, straight connector, 5 poles, pre-wired cable 5 m
CD 10	M12, straight connector, 5 poles, pre-wired cable 10 m
CD 15	M12, straight connector, 5 poles, pre-wired cable 15 m
CD 20	M12, straight connector, 5 poles, pre-wired cable 20 m
CD 95	M12, 90° angle connector, 5 poles, pre-wired cable 5 m
CD 910	M12, 90° angle connector, 5 poles, pre-wired cable 10 m
CD 915	M12, 90° angle connector, 5 poles, pre-wired cable 15 m
CDM 9	M12, straight connector, 5 poles with screw terminal, PG9 cable gland
CDM 99	M12, angle connector, 5 poles with screw terminal, PG9 cable gland

ACCESSORIES



FMC

Support columns for Reer safety light curtains and for deflection mirrors, designed to provide secure fastening to the floor, fast installation, and a simple and precise adjustment of the optical alignment of the system.

MAIN FEATURES

- Steel base with springs for a perfect adjustment of the column vertical axis.
- Columns made by aluminium extrusion poles, with adjustable angular orientation.
- Easy assembling and disassembling of the light curtain in order to adjust the first beam's height, easy adjustment of the first beam's height.
- FMC B models for light curtains.
- FMC B_R models for light curtains complete with PG11 rear union for light curtain cable sheath.
- FMC S models with pre-assembled deflector mirrors to realize perimeter protections up to 4 sides.
- Optical power Reduction factor 15% (for each mirror).
- Special models equipped with mirror with protective anti-fragmentation film available on request.
- Steel foundation inserts included with the product.
- Built-in spirit level for a correct positioning of the vertical axis.

- Can be used with the following light curtains:
- Admiral
- Janus
- Vision
- Metron

WARNING !

The following rules should be taken into consideration when using deflector mirrors:

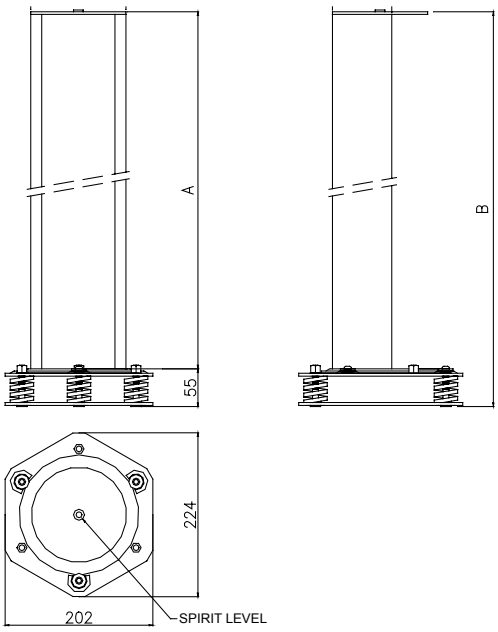
- the working distance (range) is given by the sum of the lengths of all the sides giving access to the protected area.
- for each mirror used the maximum working range between the Emitter and the Receiver is reduced by 15%.
- place the mirrors so as to ensure compliance with the minimum safety distance on each side from which the danger zone can be accessed.
- when light curtains and grids are working with long distance or with deflector mirrors, it is recommendable to use the LAD laser pointer for a quick and reliable alignment of the system.

TECHNICAL FEATURES AND DIMENSIONS mm

COLUMNS FOR LIGHT GRIDS / CURTAINS					
Standard models	**FMC-B2**	**FMC-B3**	**FMC-B4**	**FMC-B1700**	**FMC-B2000**
Models with PG11 rear union for cable sheath	**FMC-B2R**	**FMC-B3R**	**FMC-B4R**	**FMC-B1700R**	**FMC-B2000R**
Overall height with base mm	1055	1255	1385	1725	2025
or light grids/curtains with	2 beams	3 beams	4 beams	controlled height up to 1360 mm	controlled height up to 1660 mm

COLUMNS WITH DEFLECTION MIRROR					
MODELS	**FMC-S2**	**FMC-S3**	**FMC-S4**	**FMC-S1700**	**FMC-S2000**
Overall height with base mm	1055	1255	1385	1725	2025
or light grids/curtains with	2 beams	3 beams	4 beams	controlled height up to 1360 mm	controlled height up to 1660 mm

BASE FOR COLUMNS	
Model	**FMC-CB**
One base must be ordered for each column	



Model	A	B
COLUMNS FOR LIGHT GRIDS / CURTAINS		
FMC-B2	1000	1055
FMC-B3	1200	1255
FMC-B4	1330	1385
FMC-B1700	1670	1725
FMC-B2000	1970	2025
COLUMNS WITH DEFLECTION MIRROR		
FMC-S2	1000	1055
FMC-S3	1200	1255
FMC-S4	1330	1385
FMC-S1700	1670	1725
FMC-S2000	1970	2025
BASE FOR COLUMNS		
FMC-CB	202 x 224 x 55 h	

Each floor mounting columns includes multi-language instruction manual.

For ordering codes see page 135

SP

The SP deflection mirrors make it possible to create perimeter protection of areas with access points on multiple sides, with a considerable reduction of costs.
This solution eliminates the need to use more than one safety light curtain.

MAIN FEATURES

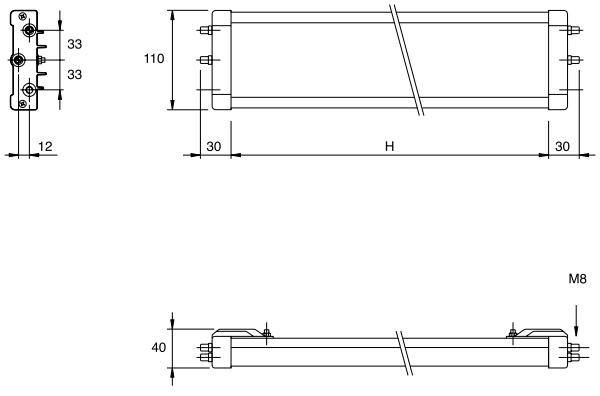
- Extruded aluminium section bar.
- Mirror pre-fitted with heights from 250 to 1900 mm.
- Angular orientation adjustable using supplied brackets.
- Optical power Reduction factor 15% (for each mirror).
- Special models equipped with mirror with protective anti-fragmentation film available on request.
- Can be used to realise perimeter protection up to 4 sides.

MODELS AND MIRROR-LIGHT CURTAIN COMBINATIONS

Mirror	For light grids/curtains with protected height mm	For light grids with
SP 100 S	160	
SP 300 S	310	
SP 400 S	460	
SP 600 S	610	2 beams
SP 700 S	760	
SP 900 S	910	3 beams
SP 1100 S	1060	4 beams
SP 1200 S	1210	
SP 1300 S	1360	
SP 1500 S	1510	
SP 1600 S	1660	
SP 1800 S	1810	

DIMENSIONS mm

Model	H
SP 100 S	250
SP 300 S	400
SP 400 S	540
SP 600 S	715
SP 700 S	885
SP 900 S	1060
SP 1100 S	1230
SP 1200 S	1400
SP 1300 S	1450
SP 1500 S	1600
SP 1600 S	1750
SP 1800 S	1900



Each mirror is supplied with two adjustable fixing brackets

Each SP Mirror includes multi-language instruction manual.

For ordering codes see page 135

WARNING !

The following rules should be taken into consideration when using deflector mirrors:
- the working distance (range) is given by the sum of the lengths of all the sides giving access to the protected area.
- for each mirror used the maximum working range between the Emitter and the Receiver is reduced by 15%.
- place the mirrors so as to ensure compliance with the minimum safety distance on each side from which the danger zone can be accessed.
- when light curtains and grids are working with long distance or with deflector mirrors, it is recommendable to use the LAD laser pointer for a quick and reliable alignment of the system.

AS-i CI5

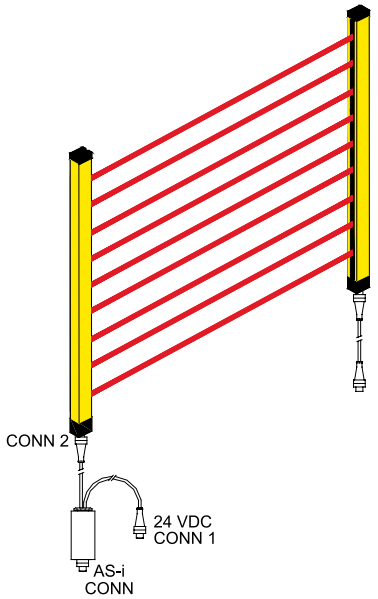
MAIN FEATURES

- Input module for 2 monitored PNP semiconductor outputs for safety light curtains and light grids
- AS-Interface LED status display
- AS-Interface M12 connector
- Thermoplastic enclosure
- Robust construction
- Protection ratings IP 67

TECHNICAL FEATURES

Safety		Type 4
Enclosure		glass-fibre reinforced thermoplastic, self-extinguishing
AS-i connection type		connector M12 x 1
Protection rating		IP 67
AS-i operating voltage		26.5 ... 31.6 Vdc, via AS-i, reverse-polarity proof
AS-i operating current		≤ 50 mA
AS-i specification		
(V 2.1)		Profile: S-0.B IO-Code: 0x0 ID-Code: 0xB ID-Code1: 0xF ID-Code2: 0xE
Inputs		
Contact	Status	Data bits
1	on	D0/D1 = dynamic code transmission
1	off	D0/D1 = static code "00"
2	on	D2/D3 = dynamic code transmission
2	off	D2/D3 = static code "00"
Outputs		A0...A3 not used
Parameter bits		P0...P3 not used
Input module address		default on address 0, programmable via the AS-Interface Master or Hand-held programming device
Signalling		AS-i voltage and communications OSSD1/2 enabling status
Power supply for light curtain		PELV power supply to IEC 364-4-41
Operating temperature °C		- 25 ÷ 60
Response time ms		≤ 20
Module dimensions		M30 x 1,5, lenght 70mm
Cable length		CONN1 = 500 mm CONN2 = 2000 mm

For ordering codes see page 135



Note:

- A separate address connector is not available as an option. The addressing must take place via the cable end or the M12 connector.
- The wiring diagram shows a light curtain with a safety input module AS-i CI5 connected to the AS-i Safety at Work system.
- The AS-i CI5 is directly connected to the light curtain receiver CONN 1. The light curtain receives its 24 VDC power supply via the second M12-cable connection CONN 2.
- The AS-i CI5 itself is connected via the M12 connector (AS-i CONN) to the AS-i network. The module has to be previously programmed with an individual adress (1 - 31).
- The light curtain emitter has to be connected separately.

CE

Safety level: **Type 4**.
Complying with:

- EN 50295 "Controller and device interface systems - AS-i"
- EN 60947-5-1 "Control circuit devices and switching elements"
- EN 954-1 "Safety-Related Parts of Control Systems - General Principles"
- EN 61496-1 "Electro-sensitive protective equipment - General requirements"
- UL (C + US) mark for USA and Canada

LAD

MAIN FEATURES

The LAD laser alignment device makes it possible to obtain a fast and reliable optical alignment of the Reer light curtains of the **Admiral**, **Vision**, **Metron** and **Janus** series; they are also compatible with the use of the **FMC** floor mounting columns.

The LAD devices emit a laser beam with **visible red light** with **useful range up to 100 m**.

Their use is recommended for aligning light curtains that operate over long distances or multiple sides with the use of deflection mirrors.

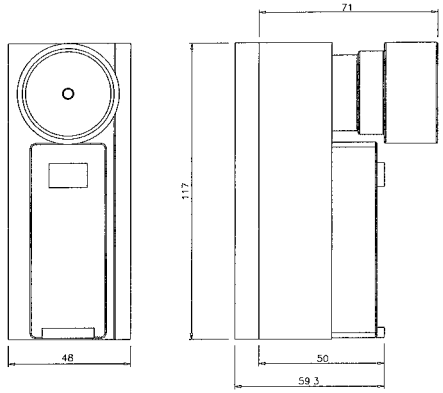
TECHNICAL FEATURES

Light source	laser diode – wavelength 650 nm
Class light source	II – EN 60825-1
Range m	100
Beam divergence mrd	< 0,5
Max. power mW	1
Power supply Vdc	3 (2 AAA batteries)
Fastening	quick fastening to the light curtains
Dimensions (h x w x d) mm	117 x 48 x 80 - LAD 2 70 x 78 x 70 - LAD 3

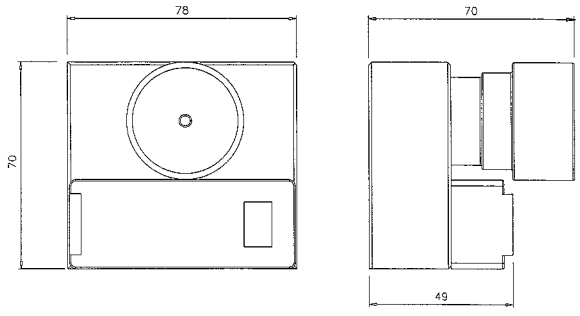
Model	for
LAD 2	Admiral - Vision - Metron
LAD 3	Janus

DIMENSIONS mm

LAD 2



LAD 3



Each LAD model includes multi-language instruction manual.

For ordering codes see page 135

SFB

MAIN FEATURES

The SFB swivel brackets allow the rotation of the light curtain around its longitudinal axis, as well as the adjustment of its vertical and horizontal position.

The use of the SFB swivel brackets is recommended to align those Admiral, Vision and Metron light curtains which are employed in applications having a long range or using deflector mirrors.

SFB swivel brackets can only be used with Admiral, Vision or Metron.

TECHNICAL FEATURES

Model	Description
SFB	set of 4 swivel brackets
One set must be ordered for each light curtain (couple emitter + receiver)	
For ordering codes see page 135	

SAV

MAIN FEATURES

The SAV vibration dampers have been designed to avoid mechanical damage to the light curtains installed in those applications which have a high level of vibrations.
The unprotected light curtains might resent the vibrations produced by e.g. presses, **weaving machines**, etc.
! **In these cases, the use of SAV vibration dampers is highly recommended**.

- SAV 1 and SAV 2 dampers are to be used with Janus light curtains.
- SAV 3 and SAV 4 dampers are to be used with Admiral, Vision and Metron.

TECHNICAL FEATURES

models and light curtains conbination		
Model	**Description**	**for light grids/curtains with protected height mm / beams**
SAV 1	set 4 vibrations dampers	310 ÷ 1060 / 2 – 3 - 4
SAV 2	set 6 vibrations dampers	1210 ÷ 1810
SAV 3	set 2 vibrations dampers	160 ÷ 1060 / 2 – 3 - 4
SAV 4	set 3 vibrations dampers	1210 ÷ 1810
2 sets must be ordered for each light curtain (1 set for the emitter + 1 for the receiver)		
For ordering codes see page 135		

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ORDERING CODES

ADMIRAL AD page 36	
Model	ordering code
AD 151	1330000
AD 301	1330001
AD 451	1330002
AD 601	1330003
AD 751	1330004
AD 901	1330005
AD 1051	1330006
AD 1201	1330007
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AD 302	1330101
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ADMIRAL AX page 38	
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AX 301S	1334041
AX 451S	1334042
AX 601S	1334043
AX 751S	1334044
AX 901S	1334045
AX 1051S	1334046
AX 1201S	1334047

PRODUCT ORDERING CODES

AX 1501S	1334049
AX 302M	1334121
AX 452M	1334122
AX 602M	1334123
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AX 2BM	1334620
AX 3BM	1334621
AX 2BS	1334640
AX 3BS	1334641

ADMIRAL AX BK
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Model	ordering code
AX 151BK	1334060
AX 301BK	1334061
AX 451BK	1334062
AX 601BK	1334063
AX 751BK	1334064
AX 901BK	1334065
AX 1051BK	1334066
AX 1201BK	1334067
AX 1351BK	1334068
AX 1501BK	1334069
AX 1651BK	1334070
AX 1801BK	1334071
AX 152BK	1334160
AX 302BK	1334161
AX 452BK	1334162
AX 602BK	1334163
AX 752BK	1334164
AX 902BK	1334165
AX 1052BK	1334166
AX 1202BK	1334167
AX 1352BK	1334168
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AX 1802BK	1334171
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AX 454BK	1334362
AX 604BK	1334363
AX 754BK	1334364
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AX 1054BK	1334366
AX 1204BK	1334367
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AX 1654BK	1334370
AX 1804BK	1334371
AX 609BK	1334563
AX 759BK	1334564
AX 909BK	1334565
AX 1059BK	1334566
AX 1209BK	1334567
AX 1359BK	1334568
AX 1509BK	1334569
AX 1659BK	1334570
AX 1809BK	1334571
AX 301BKM	1334081
AX 451BKM	1334082
AX 601BKM	1334083
AX 751BKM	1334084
AX 901BKM	1334085
AX 1051BKM	1334086
AX 1201BKM	1334087
AX 1501BKM	1334089
AX 302BKM	1334181
AX 452BKM	1334182
AX 602BKM	1334183
AX 752BKM	1334184
AX 902BKM	1334185
AX 1052BKM	1334186
AX 1202BKM	1334187
AX 1502BKM	1334189

CONNECTORS FOR ADMIRAL
page 46

Model	ordering code
CD 5	1330950
CD 10	1330956
CD 15	1330952
CD 20	1330957
CD 95	1330951
CD 910	1330958
CD 915	1330953
CDM 9	1330954
CDM 99	1330955
C8D 5	1330980
C8D 10	1330981
C8D 15	1330982
C8D 95	1330983
C8D 910	1330984
C8D 915	1330985
C8DM 9	1330986
C8DM 99	1330987
C8DM 11	1330978
C8DM 911	1330979
CDS 03	1330990
CJBE 3	1360960
CJBE 5	1360961
CJBE 10	1360962

JANUS M
page 53

Model	ordering code
MI 2B	1360660
MI 3B	1360661
MI 4B	1360662
MI 2B LR	1360670
MI 3B LR	1360671
MI 4B LR	1360672
MI 2B TRX	1360680
MI 2B TRXL	1360681
ML 2B	1360020
ML 3B	1360021
ML 2B S2	1360024
ML 3B S2	1360025
MT 2B	1360030
MT 3B	1360031
MT 2B S4	1360034
MT 3B S4	1360035
MI 303	1360241

PRODUCT ORDERING CODES

MI 453	1360242
MI 603	1360243
MI 753	1360244
MI 903	1360245
MI 1053	1360246
MI 1203	1360247
MI 304	1360375
MI 454	1360376
MI 604	1360377
MI 754	1360378
MI 904	1360379
MI 1054	1360380
MI 1204	1360381
MI 1354	1360382
MI 1504	1360383
MI 1654	1360384
MI 1804	1360385
MI 604 LR	1360388
MI 904 LR	1360390
MI 1204 LR	1360392
MI 309	1360541
MI 459	1360542
MI 609	1360543
MI 759	1360544
MI 909	1360545
MI 1059	1360546
MI 1209	1360547
MI 1359	1360548
MI 1509	1360549
MI 1659	1360550
MI 1809	1360551
ML 2B TRX	1360040
ML 3B TRX	1360041
MT 2B TRX	1360050
MT 3B TRX	1360051
MI 2B TRX	1360680
MI 3B TRXL	1360681
MI 2B TRX	1360682
MI 3B TRXL	1360683

JANUS J
page 62

Model	ordering code
J 2B	1360640
J 3B	1360641
J 4B	1360642
J 2B LR	1360630
J 3B LR	1360631
J 4B LR	1360632
J 604 LR	1360363
J 904 LR	1360365
J 1204 LR	1360367
J 2B TRX	1360650
J 2B TRXL	1360651
J 3B TRXL	1360652

ACCESSORIES FOR JANUS
Page 69

Model	ordering code
MJB 1	1360930
MJB 2	1360931
MJB 3	1360932
MJB 4	1360933
SL	1360060
S2L	1360061
S1L	1360064

CONNECTORS FOR JANUS
page 70

Model	ordering code
CJ 3	1360950
CJ 5	1360951
CJ 10	1360952
CJ 15	1360953
CJ 20	1360954
CJ M23	1360955
CD 5	1330950
CD 10	1330956
CD 15	1330952
CD 20	1330957
CDM 9	1330954
CJBR 3	1360970
CJBR 5	1360971
CJBR 10	1360972
CJBE3	1360960
CJBE5	1360961
CJBE10	1360962
CJM9	1360982
CJ95	1360983

CONNECTORS FOR JANUS J TRX
page 69

Model	ordering code
C8D 5	1330980
C8D 10	1330981
C8D 15	1330982
C8D 95	1330983
C8D 910	1330984
C8D 915	1330985
C8DM 9	1330986
C8DM 99	1330987
C8DM 11	1330978
C8DM 911	1330979

PHARO
page 78

Model	ordering code
PHR 332	1350041
PHR C3L5	1350061
PHR CSL2	1350070
PHR B3	1350050
PHR B4	1350051
PHR B5	1350052

VISION V
page 86

Model	ordering code
V 152L	1340100
V 302L	1340101
V 452L	1340102
V 602L	1340103
V 752L	1340104
V 902L	1340105
V 1052L	1340106
V 1202L	1340107
V 1352L	1340108
V 1502L	1340109
V 1652L	1340110
V 1802L	1340111
V 152H	1340120
V 302H	1340121
V 452H	1340122
V 602H	1340123
V 752H	1340124
V 902H	1340125
V 1052H	1340126
V 1202H	1340127
V 1352H	1340128
V 1502H	1340129
V 1652H	1340130
V 1802H	1340131
V 153L	1340200
V 303L	1340201
V 453L	1340202
V 603L	1340203
V 753L	1340204
V 903L	1340205
V 1053L	1340206
V 1203L	1340207
V 1353L	1340208
V 1503L	1340209
V 1653L	1340210
V 1803L	1340211
V 153H	1340220
V 303H	1340221
V 453H	1340222
V 603H	1340223
V 753H	1340224
V 903H	1340225
V 1053H	1340226
V 1203H	1340227
V 1353H	1340228
V 1503H	1340229
V 1653H	1340230
V 1803H	1340231

ORDERING CODES

V 304L	1340301
V 454L	1340302
V 604L	1340303
V 754L	1340304
V 904L	1340305
V 1054L	1340306
V 1204L	1340307
V 1354L	1340308
V 1504L	1340309
V 1654L	1340310
V 1804L	1340311
V 304H	1340321
V 454H	1340322
V 604H	1340323
V 754H	1340324
V 904H	1340325
V 1054H	1340326
V 1204H	1340327
V 1354H	1340328
V 1504H	1340329
V 1654H	1340330
V 1804H	1340331
V 305L	1340401
V 455L	1340402
V 605L	1340403
V 755L	1340404
V 905L	1340405
V 1055L	1340406
V 1205L	1340407
V 1355L	1340408
V 1505L	1340409
V 1655L	1340410
V 1805L	1340411
V 305H	1340421
V 455H	1340422
V 605H	1340423
V 755H	1340424
V 905H	1340425
V 1055H	1340426
V 1205H	1340427
V 1355H	1340428
V 1505H	1340429
V 1655H	1340430
V 1805H	1340431
V 309L	1340501
V 459L	1340502
V 609L	1340503
V 759L	1340504
V 909L	1340505
V 1059L	1340506
V 1209L	1340507
V 1359L	1340508
V 1509L	1340509
V 1659L	1340510
V 1809L	1340511
V 309H	1340521
V 459H	1340522
V 609H	1340523
V 759H	1340524
V 909H	1340525
V 1059H	1340526
V 1209H	1340527
V 1359H	1340528
V 1509H	1340529
V 1659H	1340530
V 1809H	1340531
V 2BL	1340600
V 3BL	1340601
V 4BL	1340602
V 2BH	1340610
V 3BH	1340611
V 4BH	1340612

VISION VX
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Model	ordering code
VX 152	1344100
VX 302	1344101
VX 452	1344102
VX 602	1344103
VX 752	1344104
VX 902	1344105
VX 1052	1344106
VX 1202	1344107
VX 1352	1344108
VX 1502	1344109
VX 1652	1344110
VX 1802	1344111
VX 153	1344200
VX 303	1344201
VX 453	1344202
VX 603	1344203
VX 753	1344204
VX 903	1344205
VX 1053	1344206
VX 1203	1334207
VX 1353	1344208
VX 1503	1344209
VX 1653	1344210
VX 1803	1344211
VX 304	1344301
VX 454	1344302
VX 604	1344303
VX 754	1344304
VX 904	1344305
VX 1054	1344306
VX 1204	1344307
VX 1354	1344308
VX 1504	1344309
VX 1654	1344310
VX 1804	1344311
VX 305	1344401
VX 455	1344402
VX 605	1344403
VX 755	1344404
VX 905	1344405
VX 1055	1344406
VX 1205	1344407
VX 1355	1344408
VX 1505	1344409
VX 1655	1344410
VX 1805	1344411
VX 309	1344501
VX 459	1344502
VX 609	1344503
VX 759	1344504
VX 909	1344505
VX 1059	1344506
VX 1209	1344507
VX 1359	1344508
VX 1509	1344509
VX 1659	1344510
VX 1809	1344511
VX 2B	1344600
VX 3B	1344601
VX 4B	1344602
VX 153M	1344220
VX 303M	1344221
VX 453M	1344222
VX 603M	1344223
VX 753M	1344224
VX 903M	1344225
VX 1053M	1344226
VX 1203M	1344227
VX 1503M	1344229
VX 153S	1344240
VX 303S	1344241
VX 453S	1344242
VX 603S	1344243
VX 753S	1344244
VX 903S	1344245
VX 1053S	1344246
VX 1203S	1344247
VX 1503S	1344249
VX 304M	1344321
VX 454M	1344322
VX 604M	1344323
VX 754M	1344324
VX 904M	1344325
VX 1054M	1344326
VX 1204M	1344327
VX 1504M	1344329
VX 304S	1344341
VX 454S	1344342
VX 604S	1344343
VX 754S	1344344
VX 904S	1344345
VX 1054S	1344346

VX 1204S	1344347
VX 1504S	1344349
VX 305M	1344421
VX 455M	1344422
VX 605M	1344423
VX 755M	1344424
VX 905M	1344425
VX 1055M	1344426
VX 1205M	1344427
VX 1505M	1344429
VX 305S	1344441
VX 455S	1344442
VX 605S	1344443
VX 755S	1344444
VX 905S	1344445
VX 1055S	1344446
VX 1205S	1344447
VX 1505S	1344449
VX 2BM	1344620
VX 3BM	1344621
VX 2BS	1344640
VX 3BS	1344641

VISION VXL
page 92

Model	ordering code
VXL 153	1344700
VXL 303	1344701
VXL 453	1344702
VXL 603	1344703
VXL 753	1344704
VXL 903	1344705
VXL 1053	1344706
VXL 1203	1344707
VXL 304	1344711
VXL 454	1344712
VXL 604	1344713
VXL 754	1344714
VXL 904	1344715
VXL 1054	1344716
VXL 1204	1344717
VXL 2B	1344720
VXL 3B	1344721
VXL 4B	1344722

VISION MXL
page 94

Model	ordering code
MXL 153	1344800
MXL 303	1344801
MXL 453	1344802
MXL 603	1344803
MXL 753	1344804
MXL 903	1344805
MXL 1053	1344806
MXL 1203	1344807
MXL 304	1344811
MXL 454	1344812
MXL 604	1344813
MXL 754	1344814
MXL 904	1344815
MXL 1054	1344816
MXL 1204	1344817
MXL 2B	1344820
MXL 3B	1344821
MXL 4B	1344822

CONNECTORS FOR VISION
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Model	ordering code
CD 5	1330950
CD 10	1330956
CD 15	1330952
CD 20	1330957
CD 95	1330951
CD 910	1330958
CD 915	1330953
CDM 9	1330954
CDM 99	1330955
C8D 5	1330980
C8D 10	1330981
C8D 15	1330982
C8D 95	1330983
C8D 910	1330984
C8D 915	1330985
C8DM 9	1330986
C8DM 99	1330987
C8DM 11	1330978
C8DM 911	1330979
C12D 3	1330991
C12D 5	1330992
C12D 10	1330993
CDS 03	1330990
CJBE 3	1360960
CJBE 5	1360961
CJBE 10	1360962

ILION
page 100

Model	ordering code
IL 10	1200201
IL 20	1200202

CONNECTORS FOR ILION
page 101

Model	ordering code
CD 5	1330950
CD 10	1330956
CD 15	1330952
CD 20	1330957
CD 95	1330951
CD 910	1330958
CD 915	1330953
CDM 9	1330954
CDM 99	1330955

ULISSE
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Model	ordering code
UPC	1200300

CONNECTORS FOR ULISSE
page 103

Model	ordering code
C 85	1200217
C 815	1200219
C 895	1200216

SAFETY INTERFACES
page 105

Model	ordering code
AD SR1	1330900
AD SRM	1330904
AD SR0	1330902
AD SR0A	1330903
AU SX	1201710
AU SXM	1201711

METRON
page 111

Model	ordering code
ME 150 A	1380500
ME 300 A	1380501
ME 450 A	1380502
ME 600 A	1380503
ME 750 A	1380504
ME 900 A	1380505
ME 1050 A	1380506
ME 1200 A	1380507
ME 150 B	1380520
ME 300 B	1380521
ME 450 B	1380522
ME 600 B	1380523
ME 750 B	1380524
ME 900 B	1380525
ME 1050 B	1380526
ME 1200 B	1380527
ME 150 C	1380540
ME 300 C	1380541
ME 450 C	1380542
ME 600 C	1380543
ME 750 C	1380544
ME 900 C	1380545
ME 1050 C	1380546
ME 1200 C	1380547
ME 151 A	1380000
ME 301 A	1380001
ME 451 A	1380002

ORDERING CODES

ME 601 A	1380003
ME 751 A	1380004
ME 901 A	1380005
ME 1051 A	1380006
ME 1201 A	1380007
ME 1351 A	1380008
ME 1501 A	1380009
ME 1651 A	1380010
ME 1801 A	1380011
ME 1951 A	1380012
ME 2101 A	1380013
ME 2251 A	1380014
ME 2401 A	1380015
ME 151 B	1380020
ME 301 B	1380021
ME 451 B	1380022
ME 601 B	1380023
ME 751 B	1380024
ME 901 B	1380025
ME 1051 B	1380026
ME 1201 B	1380027
ME 1351 B	1380028
ME 1501 B	1380029
ME 1651 B	1380030
ME 1801 B	1380031
ME 1951 B	1380032
ME 2101 B	1380033
ME 2251 B	1380034
ME 2401 B	1380035
ME 151 C	1380040
ME 301 C	1380041
ME 451 C	1380042
ME 601 C	1380043
ME 751 C	1380044
ME 901 C	1380045
ME 1051 C	1380046
ME 1201 C	1380047
ME 1351 C	1380048
ME 1501 C	1380049
ME 1651 C	1380050
ME 1801 C	1380051
ME 1951 C	1380052
ME 2101 C	1380053
ME 2251 C	1380054
ME 2401 C	1380055
ME 302 A	1380101
ME 452 A	1380102
ME 602 A	1380103
ME 752 A	1380104
ME 902 A	1380105
ME 1052 A	1380106
ME 1202 A	1380107
ME 1352 A	1380108
ME 1502 A	1380109
ME 1652 A	1380110
ME 1802 A	1380111
ME 1952 A	1380112
ME 2102 A	1380113
ME 2252 A	1380114
ME 2402 A	1380115
ME 2552 A	1380116
ME 302 B	1380121
ME 452 B	1380122
ME 602 B	1380123
ME 752 B	1380124
ME 902 B	1380125
ME 1052 B	1380126
ME 1202 B	1380127
ME 1352 B	1380128
ME 1502 B	1380129
ME 1652 B	1380130
ME 1802 B	1380131
ME 1952 B	1380132
ME 2102 B	1380133
ME 2252 B	1380134
ME 2402 B	1380135
ME 2552B	1380136
ME 302 C	1380141
ME 452 C	1380142
ME 602 C	1380143
ME 752 C	1380144
ME 902 C	1380145
ME 1052 C	1380146
ME 1202 C	1380147
ME 1352 C	1380148
ME 1502 C	1380149
ME 1652 C	1380150
ME 1802 C	1380151
ME 1952 C	1380152
ME 2102 C	1380153
ME 2252 C	1380154
ME 2402 C	1380155
ME 2552 C	1380156
ME 303 A	1380201
ME 453 A	1380202
ME 603 A	1380203
ME 753 A	1380204
ME 903 A	1380205
ME 1053 A	1380206
ME 1203 A	1380207
ME 1353 A	1380208
ME 1503 A	1380209
ME 1653 A	1380210
ME 1803 A	1380211
ME 1953 A	1380212
ME 2103 A	1380213
ME 2253 A	1380214
ME 2403 A	1380215
ME 2553 A	1380216
ME 303 B	1380221
ME 453 B	1380222
ME 603 B	1380223
ME 753 B	1380224
ME 903 B	1380225
ME 1053 B	1380226
ME 1203 B	1380227
ME 1353 B	1380228
ME 1503 B	1380229
ME 1653 B	1380230
ME 1803 B	1380231
ME 1953 B	1380232
ME 2103 B	1380233
ME 2253 B	1380234
ME 2403 B	1380235
ME 2553 B	1380236
ME 303 C	1380241
ME 453 C	1380242
ME 603 C	1380243
ME 753 C	1380244
ME 903 C	1380245
ME 1053 C	1380246
ME 1203 C	1380247
ME 1353 C	1380248
ME 1503 C	1380249
ME 1653 C	1380250
ME 1803 C	1380251
ME 1953 C	1380252
ME 2103 C	1380253
ME 2253 C	1380254
ME 2403 C	1380255
ME 2553 C	1380256
ME 455 A	1380302
ME 605 A	1380303
ME 755 A	1380304
ME 905 A	1380305
ME 1055 A	1380306
ME 1205 A	1380307
ME 1355 A	1380308
ME 1505 A	1380309
ME 1655 A	1380310
ME 1805 A	1380311
ME 1955 A	1380312
ME 2105 A	1380313
ME 2255 A	1380314
ME 2405 A	1380315
ME 2555 A	1380316
ME 455 B	1380322
ME 605 B	1380323
ME 755 B	1380324
ME 905 B	1380325
ME 1055 B	1380326
ME 1205 B	1380327
ME 1355 B	1380328
ME 1505 B	1380329
ME 1655 B	1380330
ME 1805 B	1380331
ME 1955 B	1380332
ME 2105 B	1380333

ME 2255 B	1380334
ME 2405 B	1380335
ME 2555 B	1380336
ME 455 C	1380342
ME 605 C	1380343
ME 755 C	1380344
ME 905 C	1380345
ME 1055 C	1380346
ME 1205 C	1380347
ME 1355 C	1380348
ME 1505 C	1380349
ME 1655 C	1380350
ME 1805 C	1380351
ME 1955 C	1380352
ME 2105 C	1380353
ME 2255 C	1380354
ME 2405 C	1380355
ME 2555 C	1380356
ME 607 A	1380403
ME 757 A	1380404
ME 907 A	1380405
ME 1057 A	1380406
ME 1207 A	1380407
ME 1357 A	1380408
ME 1505 A	1380409
ME 1657 A	1380410
ME 1807 A	1380411
ME 1957 A	1380412
ME 2107 A	1380413
ME 2257 A	1380414
ME 2407 A	1380415
ME 2557 A	1380416
ME 607 B	1380423
ME 757 B	1380424
ME 907 B	1380425
ME 1057 B	1380426
ME 1207 B	1380427
ME 1357 B	1380428
ME 1505 B	1380429
ME 1657 B	1380430
ME 1807 B	1380431
ME 1957 B	1380432
ME 2107 B	1380433
ME 2257 B	1380434
ME 2407 B	1380435
ME 2557 B	1380436
ME 607 C	1380443
ME 757 C	1380444
ME 907 C	1380445
ME 1057 C	1380446
ME 1207 C	1380447
ME 1357 C	1380448
ME 1507 C	1380449
ME 1657 C	1380450
ME 1807 C	1380451
ME 1957 C	1380452
ME 2107 C	1380453
ME 2257 C	1380454
ME 2407 C	1380455
ME 2557 C	1380456

CONNECTORS FOR METRON page 118

Model	ordering code
C8D 5	1330980
C8D 10	1330981
C8D 15	1330982
C8DM 9	1330986
C8DM 11	1330978
C12D 3	1330991
C12D 5	1330992
C12D 10	1330993
CSL 3	1330994
CD 5	1330950
CD 10	1330956
CD 15	1330952
CD 20	1330957
CD 95	1330951
CD 910	1330958
CD 915	1330953
CDM 9	1330954
CDM 99	1330955

ACCESSORIES FMC page 120

Model	ordering code
FMC-CB	1200500
FMC-B2	1200510
FMC-B3	1200511
FMC-B4	1200512
FMC-B1700	1200518
FMC-B2000	1200516
FMC-B2R	1200513
FMC-B3R	1200514
FMC-B4R	1200515
FMC-B1700R	1200517
FMC-B2000R	1200519
FMC-S2	1200520
FMC-S3	1200521
FMC-S4	1200522
FMC-S1700	1200525
FMC-S2000	1200523

ACCESSORIES SP page 122

Model	ordering code
SP 100S	1201805
SP 200S	1201800
SP 300S	1201806
SP 400S	1201801
SP 600S	1201811
SP 700S	1201802
SP 900S	1201812
SP 1100S	1201803
SP 1200S	1201810
SP 1300S	1201807
SP 1400S	1201804
SP 1500S	1201808
SP 1600S	1201813
SP 1800S	1201814

ACCESSORIES AS-i CI5 page 123

Model	ordering code
AS-i CI5	133910

ACCESSORIES LAD page 124

Model	ordering code
LAD 2	1220301
LAD 3	1220302

ACCESSORIES SFB page 125

Model	ordering code
SFB	1330974

ACCESSORIES SAV page 125

Model	ordering code
SAV-1	1200084
SAV-2	1200085
SAV-3	1200088
SAV-4	1200089

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